THE

Journal

OF THE

AMERICAN OSTEOPATHIC ASSOCIATION

Volume Fifty-Four

OBSTETRIC AND GYNECOLOGIC NUMBER

Number 2 | 212 East Ohio St., Chicago 11, Ill. | October, 1954

New (6th) Edition . . .

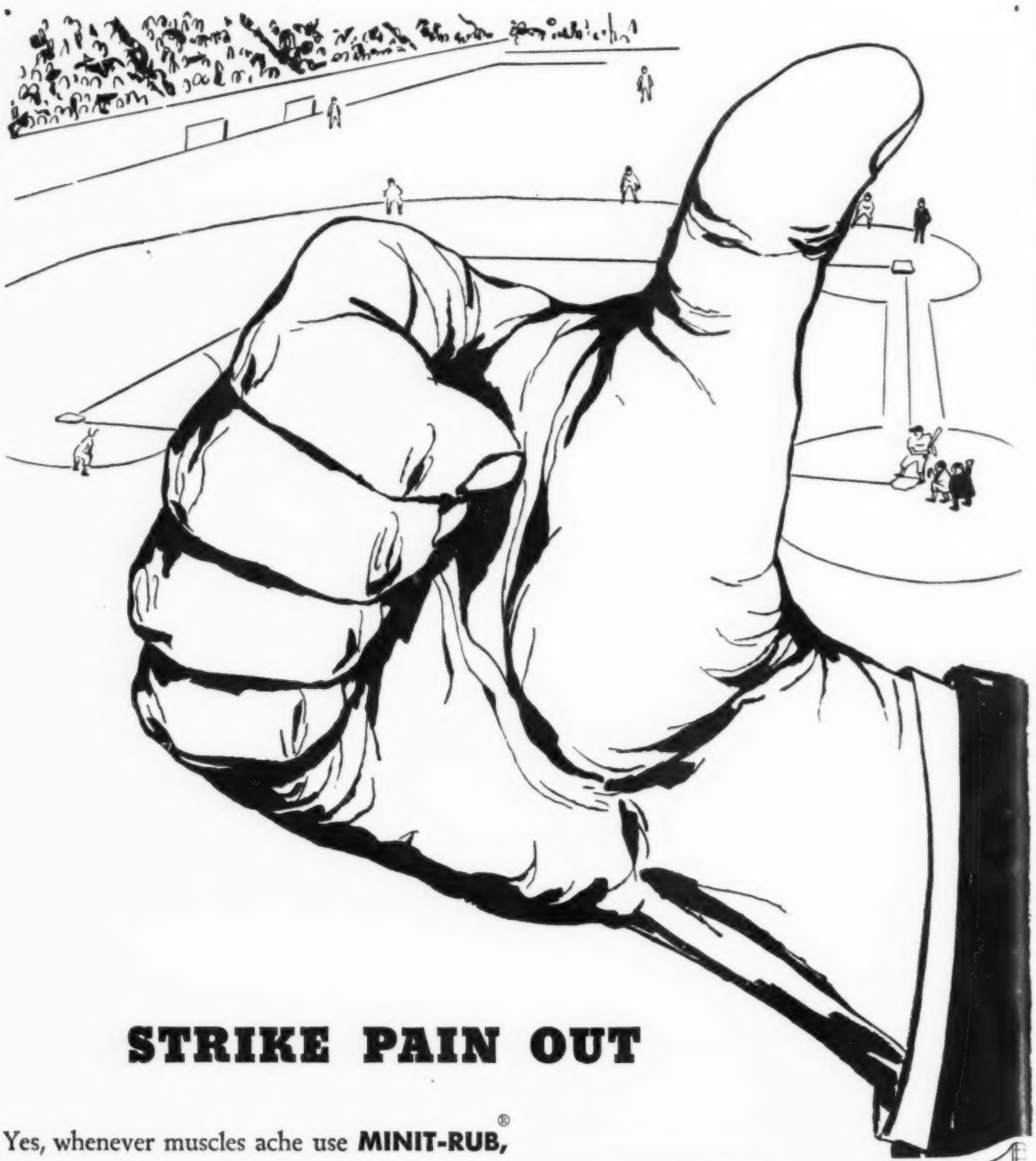
Nelson's Textbook of Pediatrics

The *New (6th) Edition* of this classic in the field presents a *complete clinical guide to the practice of pediatrics.* Coverage of disease is thorough in every respect—definition; etiology; epidemiology; pathogenesis; immunity; clinical manifestations; diagnosis; prognosis; prevention; and treatment; The care of the healthy child is included as well as that of the sick. There is also an excellent discussion on prenatal disturbances covering such topics as: prenatal factors in diseases of children; congenital malformations; advisability of parenthood; inborn errors of metabolism.

For this *New (6th) Edition,* the sections on the cardiovascular system, the blood, and neoplasms and other tumors have been rewritten and expanded. Also included are new discussions of such current topics as: Coxsackie Virus; Mucoviscidosis; Retrolental Fibroplasia; Poliomyelitis; Aseptic Meningitis Syndrome; Behavior Problems; Radiation Injury. The more than 400 illustrations, 20 in color, are masterpieces of visual instruction.

Edited by WALDO E. NELSON, M.D., Professor of Pediatrics, Temple University School of Medicine; Medical Director of Saint Christopher's Hospital for Children. With the Collaboration of 70 Authorities. 1581 pages, 7″ x 10″, with 438 illustrations, 20 in color. $15.00. *New (6th) Edition!*

W. B. SAUNDERS COMPANY • **West Washington Square, Philadelphia 5**



STRIKE PAIN OUT

Yes, whenever muscles ache use **MINIT-RUB**®, the modern counterirritant. It starts to relieve pain in a matter of minutes. Just a dab in the palm of the hand, a minute or two of brisk rubbing. A soothing warmth promotes prompt relaxation.

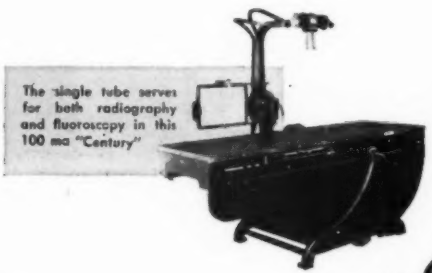
BRISTOL-MYERS COMPANY, 19 WEST 50 STREET, NEW YORK 20, N. Y.

any idea how little space a Picker "Century" needs?

See how comfortably a single-tube "Century" (with full size 76" table) fits in an 8' x 10' room. No wasted space behind the table for floor rails and tubestand supports. All manipulation (even changeover from radiography to fluoroscopy) can be done from the *front* of the table so you need never go behind it. Despite its compactness you have at command a full range of radiographic and fluoroscopic resources.

... or how versatile it is?

Whatever your x-ray need there is a "Century" combination to meet it *exactly* . . . neither more nor less.



The single tube serves for both radiography and fluoroscopy in this 100 ma "Century"

for example, you can choose among:

- 60, 100, or 200 ma capacities
- self-rectified or full-wave
- single or twin-tube models
- wide variety of rotating or stationary anode tubes
- hand-operated or motor-driven spotfilm devices
- table-mounted or birail tubestands
- motor-drive or handrock tilt tables
- vertical or console type control cabinets

... or how economical?

Any way you look at it . . . moderate first cost, modest maintenance, or high trade-in . . . a Picker "Century" is a fine buy. Nothing flimsy about it; it's built to last.

A twin-tube "Century" with Twintrack tubestand.

let your local Picker representative show you

He can tell you, too, about the Picker Rental Plan which will put a "Century" in your office without initial capital investment.

the PICKER "Century"

combination radiographic-fluoroscopic x-ray unit

Picker x ray

25 South Broadway White Plains, N. Y.

CONTENTS, OCTOBER, 1954

ORIGINAL ARTICLES—
Postural Dynamics. Robert B. Thomas, D.O., Huntington, W. Va. 91
The Role of Local Thrombocytopenia as a Cause of Menorrhagia. A Report of Six Cases. George E. Himes, D.O., Toine M. Rinne, D.O., and Virginia M. Hammel, B.A., M.T., Flint, Mich. 96
Notes Concerning the Duoetiology of Disease. Relation of Certain Gram Negative Bacilli to Brucellosis and Brucella-Like Infections. Richard G. Taylor, B.S., A.M., Patrick Martin, B.S., M.S., M. T. Pritchard, B.A., M.P.H., J. Eugene Mielcarek, B.S., M.S., and James L. Rowland, B.A., M.P.H., Kansas City, Mo. 99
Nitrous Oxide-Oxygen Potentiation. A Clinical Study. A. A. Golden, D.O., Wilmington, Del. 102

EDITORIALS—
I—Research and Education in Osteopathy 109
Spotlight on Los Angeles 110

NOTES AND COMMENTS 111

SPECIAL ARTICLES—
Occlusal Dysharmonies as Related to Cranial Nerve Syndromes. Matthew Eisenman, D.D.S., Wilmington, Del. 114
Psychiatry and Industry. Cecil Harris, D.O., F.A.C.N., Philadelphia 119
Structural Diagnosis and Osteopathic Management of Chronic Degenerative Disease. J. Bartley Jones, B.S., Friendsville, Tenn. 124

OBSTETRIC AND GYNECOLOGIC SUPPLEMENT—
Editorials:
Presidential Message. Arthur A. Speir, D.O., F.A.C.O.O.G., Merrill, Mich. 129
Convention of 1955. Jerry O. Carr, D.O., Fort Worth, Tex., and Harold C. Bruckner, D.O., Flint, Mich. 129
The National Osteopathic Obstetric Committee. Lester Eisenberg, D.O., Upper Darby, Pa. 129
From the Office of the Secretary-Treasurer. H. K. Morgan, D.O., Denver 130
Articles:
The Management of Breech Presentation. A Two-Year Study from the Department of Obstetrics and Gynecology, Detroit Osteopathic Hospital. James G. Matthews, D.O., F.A.C.O.O.G.; Milton K. Miller, D.O.; and Astrid A. Delitzsch, D.O., Detroit 130
Uterodynamics and Physiologic Forces of Labor. Homer F. Matz, D.O., Ash Grove, Mo. 136
Culdoscopy in Gynecology. Arthur P. Shneidman, A.B., D.O., Los Angeles 140
Female Endocrine Physiology from Puberty to the Climacteric. Julian Lansing Mines, D.O., F.A.C.O.O.G., Los Angeles 144

DEPARTMENT OF PUBLIC AFFAIRS—
Bureau of Public Education on Health: New Publication in Legal Medicine 146

DEPARTMENT OF PUBLIC RELATIONS—
Bills in Congress 147
New England Board of Higher Education Compact 148
Oral Prescriptions for Certain Narcotic Drugs 148
Transfer of Indian Health Service 148
Disability Freeze 148

CURRENT LITERATURE 149
BOOK NOTICES 151
CONVENTIONS AND MEETINGS ..... ad p. 51
STATE AND NATIONAL BOARDS ..... ad p. 52
BOOKS RECEIVED ..... ad p. 63

AUTHOR AND SUBJECT INDEX

American College of Osteopathic Obstetricians and Gynecologists:
convention of 1955, [Carr and Bruckner] 129
from the office of the secretary-treasurer, [Morgan] 130
National Osteopathic Obstetric Committee, [Eisenberg] 129
presidential message, [Speir] 129
Supplement contributed by 127
Anesthesia, nitrous oxide-oxygen potentiation; clinical study, [Golden] 102
Book Notices:
Physical Medicine and Rehabilitation. Basil Kiernander, Ed. 151
Report of the 1953 Convention. American Osteopathic Hospital Association 151
Clinical Allergy. French K. Hansel 151
Diseases of the Liver. Mitchell A. Spellberg 151
Clinical Electrocardiography in Children. Gertrude H. B. Nicolson 151
Recurrent Dislocation of the Shoulder. James A. Dickson, Alfred W. Humphries, and Harry W. O'Dell 152
An Atlas of Pelvic Operations. Langdon Parsons and Howard Ulfelder 152
Fundamentals of Biochemistry in Clinical Medicine. Niels C. Klendshoj 152
Unipolar Lead Electrocardiography and Vectorcardiography. Emanuel Goldberger 152
Peripheral Nerve Injuries. Webb Haymaker and Barnes Woodhall 153
Dizziness. David Downs DeWeese 153
Practical Clinical Chemistry. Alma Hiller 153
Diseases of the Liver, Gallbladder and Bile Ducts. S. S. Lichtman 153
Functional and Surgical Anatomy of the Hand. Emanuel B. Kaplan 153
Pain Syndromes and Their Treatment. James M. Tarsy 154
Slipped Capital Femoral Epiphysis. Armin Klein, Robert J. Joplin, John A. Reidy, and Joseph Hanelin 154
Applied Anatomy and Kinesiology. Wilbur Pardon Bowen 154
Rheumatic Diseases. Eugene F. Traut 154
Legal Medicine. R. B. H. Gradwohl, Ed. 154
Legal Medicine. Thomas A. Gonzales, Morgan Vance, Milton Helpern, and Charles J. Umberger 154
Books Received ..... ad p. 63
Breech Presentation: See Labor
Brucellosis, notes concerning duoetiology of disease; relation of certain gram negative bacilli to brucellosis and brucella-like infections, [Taylor, Martin, Pritchard, Mielcarek, and Rowland] 99
Bruckner, Harold C.: See Carr, Jerry O., jt. author
Carr, Jerry O., and Bruckner, Harold C.:
Convention of 1955 129
Conventions and meetings, announcements ..... ad p. 51
Culdoscopy: See Gynecology
Current Literature 149
Delitzsch, Astrid A.: See Matthews, James G., jt. author
Dentistry, occlusal dysharmonies as related to cranial nerve syndromes, [Eisenman] 114
Disease:
chronic degenerative, structural diagnosis and osteopathic management, [Jones] 124
notes concerning duoetiology, [Taylor, Martin, Pritchard, Mielcarek, and Rowland] 99
Education:
New England Board of Higher Education compact 148
research and education in osteopathy 109
Eisenberg, Lester:
The National Osteopathic Obstetric Committee 129
Eisenman, Matthew:
Occlusal dysharmonies as related to cranial nerves syndromes 114
Endocrine glands, female endocrine physiology from puberty to climacteric, [Mines] 144
Examinations: See State and National Boards
Golden, A. A.:
Nitrous oxide-oxygen potentiation. A clinical study 102
Gynecology: See also American College of Osteopathic Obstetricians and Gynecologists
culdoscopy in, [Shneidman] 140
female endocrine physiology from puberty to climacteric, [Mines] 144
Hammel, Virginia M.: See Himes, George E., jt. author
Harris, Cecil:
Psychiatry and industry 119
Heart:
disease, coronary, shoulder pain and, [Schiefley] 150
disease, patterns of mortality ..... ad p. 62
Himes, George E.; Rinne, Toine M.; and Hammel, Virginia M.:
The role of local thrombocytopenia as a cause of menorrhagia 96
Hospital, Los Angeles County Osteopathic, spotlight on 110
Indian Health Service, transfer 148
Industry and psychiatry, [Harris] 119
Jones, J. Bartley:
Structural diagnosis and osteopathic management of chronic degenerative disease 124
Labor:
management of breech presentation, [Matthews, Miller, and Delitzsch] 130
uterodynamics and physiologic forces of labor, [Matz] 136
Legal and Legislative:
bills in Congress 147
disability freeze 148
New England Board of Higher Education compact 148
new publications in legal medicine 146
oral prescriptions for certain narcotic drugs 148
transfer of Indian Health Service 148
Licensure: See State and National Boards
Martin, Patrick: See Taylor, Richard G., jt. author
Matthews, James G.; Miller, Milton K., and Delitzsch, Astrid A.:
The management of breech presentation. A two-year study from the Department of Obstetrics and Gynecology, Detroit Osteopathic Hospital 130
Matz, Homer F.:
Uterodynamics and physiologic forces of labor 136
Medicine, legal, new publications 146
Membership, A.O.A.:
applications ..... ad p. 65
changes of address and new locations ..... ad p. 65
Menorrhagia: See Menstruation, disorders
Mielcarek, J. Eugene: See Taylor, Richard G., jt. author
Menstruation, disorders, role of local thrombocytopenia as cause of menorrhagia, [Himes, Rinne, and Hammel] 96
Miller, Milton K.: See Matthews, James G., jt. author
Mines, Julian Lansing:
Female endocrine physiology from puberty to the climacteric 144
Morgan, H. K.:
From the office of the secretary-treasurer 130
Narcotic drugs, oral prescriptions for 148
National Board of Examiners for Osteopathic Physicians and Surgeons: See State and National Boards
Nerves, cranial, syndromes related to occusal dysharmonies, [Eisenman] 114
Notes and Comments 111
Obstetrics: See American College of Osteopathic Obstetricians and Gynecologists; Labor
Old Age, better care for older people, [Scheele] ..... ad p. 56
Osteopathy:
postural dynamics, [Thomas] 91
research and education 109
structural diagnosis and osteopathic management of chronic degenerative disease, [Jones] 124
Postural dynamics, [Thomas] 91
Presentation: See Labor
Pritchard, M. T.: See Taylor, Richard G., jt. author
Psychiatry and industry, [Harris] 119
Reregistration of Osteopathic Licenses: See State and National Boards
Research and education in osteopathy 109
Rinne, Toine M.: See Himes, George E., jt. author
Rowland, James L.: See Taylor, Richard G., jt. author
Shneidman, Arthur P.:
Culdoscopy in gynecology 140
Shoulder pain and coronary heart disease, Schiefley] 150
Social Security, disability freeze 148
Speir, Arthur A.:
Presidential message 129
State and National Boards:
announcements ..... ad p. 52
examinations by National Board ..... ad p. 56
reregistration of osteopathic licenses ..... ad p. 55
Swope, Chester D.:
Department of Public Relations 147
Taylor, Richard G.; Martin, Patrick; Pritchard, M. T.; Mielcarek, J. Eugene; and Rowland, James L.:
Notes concerning the duoetiology of disease; relation of certain gram negative bacilli to brucellosis and brucella-like infections 99
Thomas, Robert B.:
Postural dynamics 91
Thrombocytopenia, local, as a cause of menorrhagia, [Himes, Rinne, and Hammel] 96
Ulansey, Glenn F.:
Book notices 151
Uterodynamics and physiologic forces of labor, [Matz] 136

Published monthly by the American Osteopathic Association. Printed by Pioneer Publishing Company, Publication Office, 100 S. Kenilworth Ave., Oak Park, Ill. **EDITORIAL AND EXECUTIVE OFFICES,** 212 E. Ohio St., Chicago 11, Ill. Subscription $10 a year; single copies, $1.00. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized August 31, 1922. Entered at Oak Park, Ill., Post Office as second class matter, April 1, 1926, under Act of March 3, 1879.

ALL CORRESPONDENCE should be addressed to 212 E. Ohio St., Chicago, Ill. **CHANGE OF ADDRESS:** If possible, clip address from mailing envelope of your copy of this magazine and send along with new address (with zone number if any). Allow 5 weeks for change-over.

FIRST COMPLETE FORMULA

EXPRESSLY

FOR THE COUGHING PATIENT

relieves cough "tickle," quiets "hack"

curbs congestive symptoms

patients feel better, sleep better

relieves aches and pains

valuable in allergic or bronchial coughs

new

CORICIDIN

syrup

tastes good—an ideal vehicle

Each teaspoonful (5 cc.) of CORICIDIN Syrup* contains:

Dihydrocodeinone bitartrate	1.67 mg.
CHLOR-TRIMETON Maleate	2.0 mg.
Sodium salicylate	225.0 mg.
Sodium citrate	120.0 mg.
Caffeine	30.0 mg.
Glyceryl guaiacolate	30.0 mg.

combined in a delicious, compatible syrup acceptable to all ages.

Dosage: Adults: One teaspoonful initially followed by another teaspoonful in one hour. Thereafter one teaspoonful three to four times daily.

Children: One-half adult dosage for those 6-12 years old. Children under 6 years according to age or body weight.

*Exempt narcotic.

CORICIDIN,® brand of analgesic-antipyretic compound.
CHLOR-TRIMETON® Maleate, brand of chlorprophenpyridamine maleate.

Schering

CORICIDIN syrup

NOW the safest agent yet developed for decisive control of BLOOD PRESSURE with 5 important firsts

UNITENS

brand of cryptenamine

Unitensen is recommended for the patient who needs more than tranquilizing effects. It produces positive, sustained falls in blood pressure.

This is what Unitensen Tablets do . . . and with unparalleled safety

These patients experienced sustained control of blood pressure levels over prolonged periods of time.

Summary of Case Histories-Series A*

Age—Sex	BP—mm. Hg. BEFORE	BP—mm. Hg. AFTER
64—M	190/115	140/90
37—M	200/130	130/85
48—M	230/140	140/100
46—M	220/140	160/110
41—M	210/140	155/110
43—M	200/120	160/110
26—M	230/130	180/120
44—M	220/130	175/120
46—M	220/120	162/90

(Write for complete clinical data, including case histories.)

*Personal communication to Irwin, Neisler & Company.

FIRST IN MAINTAINING DECISIVE BLOOD PRESSURE CONTROL

The sole therapeutic agent in Unitensen Tablets is cryptenamine—a potent blood pressure lowering alkaloid fraction isolated by the research staff of Irwin, Neisler & Company. In the majority of cases (see chart at left), cryptenamine will lower blood pressure decisively, and will control blood pressure at the lower levels for prolonged periods of time.

FIRST IN SAFETY

Unitensen Tablets exert a central action on the blood pressure lowering mechanism. Circulatory equilibrium is not disrupted. Improved circulation and improved work of the heart are often attained, *along with the decisive fall in blood pressure.*

Unitensen Tablets have no sympatholytic or parasympatholytic action. Ganglionic blocking does not occur. Unitensen Tablets *do not* cause postural hypotension and collapse, an ever-present risk with other potent blood pressure lowering drugs. Renal function is *not* impaired.

FIRST WITH DUAL ASSAY

Unitensen is biologically standardized twice, first for hypotensive response and, second, for side effects (emesis) in the dog so that a safe therapeutic range between the two is assured. In extensive clinical trials only a few isolated cases exhibited occasional vomiting.

Unitensen Tablets do not cause the serious side effects common to widely used synthetic hypotensives. Unitensen Tablets can be given over long periods of time with entire dependability. Cumulative effects have not been noted.

FIRST IN SIMPLE DOSAGE

Start with 2 tablets daily, given immediately after breakfast and at bedtime. If more tablets are needed, include an afternoon dose at 1 or 2 p.m.

FIRST IN ECONOMY

Because of lower dosage, Unitensen Tablets save your patients ⅓ to ½ over the cost of other potent blood pressure lowering agents.

Each Unitensen Tablet contains: Cryptenamine*.....2 mg.†
(as the tannate salt)

*Ester alkaloids of Veratrum viride obtained by an exclusive Irwin-Neisler nonaqueous extraction process.
†Equivalent to 260 Carotid Sinus Reflex Units.

IRWIN, NEISLER & COMPANY DECATUR, ILLINOIS

SEN®

TANNATE TABLETS

Bottles of 50, 100, 500 and 1000.

VAGINAL ANATOMY AND CONCEPTION CONTROL

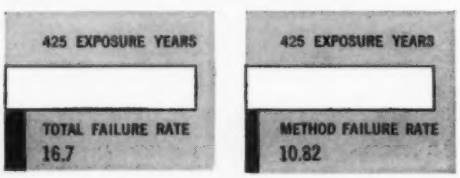
Another observation based on 425 patient years of exposure

According to a recent comparative study by Guttmacher and co-workers,[1] vaginal anatomy and parity apparently play important roles in the selection of a contraceptive method. Using the jelly-alone method, they found that markedly greater protection was afforded to women of low parity, and suggested that the jelly "might be confined to the region of the external os more successfully in the less relaxed vagina."

Of 325 women who used the jelly-alone [RAMSES® VAGINAL JELLY] technic for periods ranging from three months to three years, 36 percent were primiparous. The statistically valid data, based on 425 patient years of exposure, definitely indicate that the jelly-alone method of contraception was considerably more effective "among patients of lower parity."

The use of jelly alone as a contraceptive measure proved highly successful in the entire group, and only a few unplanned pregnancies occurred. These were either considered as (1) patient failures, comprising those instances in which the patient admitted complete omission or irregular use of the jelly, or as (2) method failures, where the patient claimed regular and careful use of the jelly.

The total unplanned pregnancy rate averaged only 16.7 per 100 patient years of exposure. If method failures alone are calculated, the unplanned pregnancy rate was reduced to 10.82 per 100 patient years of exposure.



Effectiveness of RAMSES VAGINAL JELLY as contraceptive measure in 325 patients during 425 patient exposure years[1]

It is apparent from this study that RAMSES VAGINAL JELLY is markedly effective in the jelly-alone technic, and that it is a "method of choice" for most nulliparous and primiparous patients.

Anatomic considerations, however, should not be the sole criteria used in the selection of a contraceptive method. Such factors as patient intelligence and cooperation, as well as the sincere desire for conception control, are also of paramount importance. Thus, the choice of method must, in the end, depend upon the physician's evaluation of the individual patient.

When in the judgment of the physician, parity, anatomic factors, or motivation indicates the use of the diaphragm-and-jelly method of contraception, the RAMSES® TUK-A-WAY® Kit is recommended. The RAMSES® diaphragm is flexible and cushioned — providing an optimum barrier with utmost comfort. In combination with RAMSES jelly, it offers an unsurpassed contraceptive technic — and both products are **accepted by the appropriate Councils** of the American Medical Association.

Physicians may now obtain a complimentary package of RAMSES VAGINAL JELLY.* Requests on your prescription blank should be mailed to Dept. OA2 Julius Schmid, Inc., 423 West 55th Street, New York 19, N.Y.

*Active agent, dodecaethyleneglycol monolaurate 5%, in a base of long-lasting barrier effectiveness.

1. Finkelstein, R.; Guttmacher, A., and Goldberg, R.: Am. J. Obst. & Gynec. 63:664, Mar., 1952.

JULIUS SCHMID, INC., ***gynecological division***
423 West 55th Street, New York, 19, N. Y.

Rauwiloid®

The ORIGINAL alseroxylon fraction of Rauwolfia

Serves Better

in every grade...every type...of HYPERTENSION

JUST as no isolated crystalline alkaloid of belladonna can equal the clinical efficacy of the combined belladonna alkaloids-

So no single contained alkaloid of rauwolfia—regardless of the brand name under which it is marketed—can guarantee the balanced action of the several alkaloids in Rauwiloid.

Besides reserpine, Rauwiloid contains other active alkaloids, such as rescinnamine, [1,2] reported to be more hypotensive, less sedative than reserpine. Rauwiloid represents the total hypotensive activity of the pure whole Rauwolfia serpentina (Benth.) root, but without the inert dross of the whole root and its undesirable substances such as yohimbine-type alkaloids.

1. Klohs, M.W.; Draper, M. D., and Keller, F.: J. Am. Chem. Soc. *76*:2843 (May 20) 1954.
2. Cronheim, G.; Brown, W.; Cawthorne, J.; Tcekes, M. I., and Ungari, J.: Proc. Soc. Exper. Biol. & Med. *86*:110 (May) 1954.

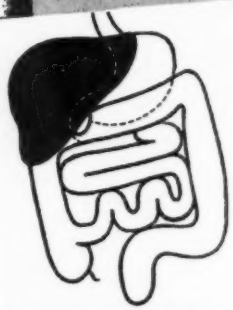
So Easy, too...
merely two 2 mg. tablets at bedtime!

Rauwiloid is fractionated only from true, unadulterated Rauwolfia serpentina, Benth. It shows virtually no side actions, even fewer than other rauwolfia preparations, and there are no contraindications. It rarely needs upward dosage adjustment.

Riker LABORATORIES, INC., LOS ANGELES 48, CALIF.

it takes more than spasmolysis to relieve functional G. I. distress

Decholin/Belladonna



prescribe these double benefits

reliable spasmolysis
inhibits smooth-muscle spasm...
suppresses incoordinate peristalsis...
facilitates biliary and pancreatic drainage

improved liver function
increases bile flow and fluidity through *hydro*choleresis...
enhances blood supply to liver...
provides mild, natural laxation—without catharsis

DECHOLIN® with Belladonna

for prompt, more effective relief of belching, bloating, flatulence, nausea, indigestion and constipation

Dosage: One or, if necessary, two *Decholin*/Belladonna Tablets three times daily.

Composition: Each tablet of *Decholin*/Belladonna contains *Decholin* (dehydrocholic acid, *Ames*) 3¾ gr., and ext. of belladonna, ⅛ gr. (equivalent to tincture of belladonna, 7 minims). Bottles of 100.

AMES COMPANY, INC.

ELKHART, INDIANA

Ames Company of Canada, Ltd., Toronto

54154

in the grossly obese **APPETITE REDUCTION PLUS PROTECTION**

Obocell® Complex

In treating the grossly obese, consider the important three-way protection of Obocell Complex:

1. **Protection against hunger pangs**
2. **Protection for the damaged liver**
3. **Support for co-enzymes**

Each Obocell Complex Capsule supplies:	
d-Amphetamine Phosphate (dibasic)	5 mg.
Nicel*	100 mg.
Choline Bitartrate	200 mg.
Inositol	60 mg.
Thiamine Mononitrate	0.8 mg.
Riboflavin	1.2 mg.
Niacinamide	8 mg.

*Irwin-Neisler's Brand of High Viscosity Methylcellulose

Bottles of 50 and 500

A definite relationship exists between gross obesity and liver damage. Zelman[1] reports on 20 cases of gross obesity. All cases showed both *laboratory* and *histologic* evidence of liver damage.

Obocell Complex not only provides protection against liver damage but also suppresses the appetite, satisfies bulk hunger, and supplies important vitamins. Hence, it provides three-way protection for your heavily overweight patient.

1. Zelman, S.: Arch. Int. Med. 90:141, 1952.

IRWIN, NEISLER & COMPANY
DECATUR • ILLINOIS

Why

Instant
Ralston

for good daily nutrition

Whole Wheat, with 5% Extra Wheat Germ
Twice as Much as in Natural Whole Wheat

EXTRA-NUTRITIOUS
Contains *all* nutrients of whole wheat plus *all* those of the extra wheat germ.

GOOD SOURCE OF VALUABLE PROTEIN
At the low cost of less than 2¢ per 1-ounce serving.

RICH IN VITAMIN-B COMPLEX
So often inadequate in many diets.

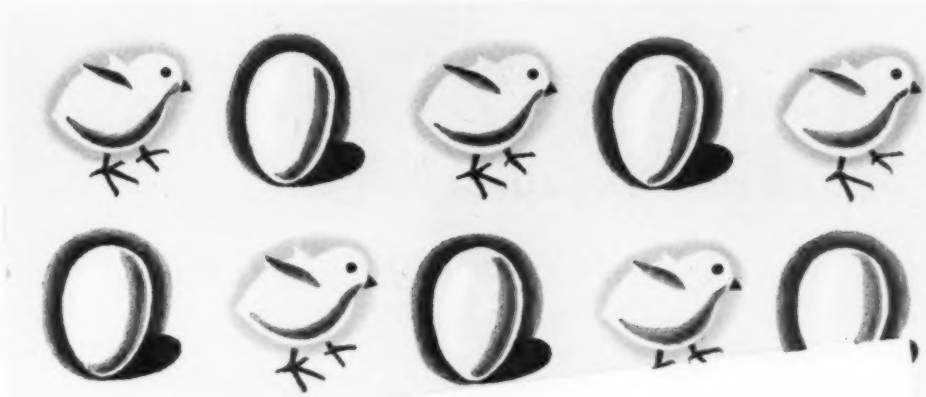
PLEASING WHOLE-GRAIN TEXTURE
Adds interest to bland diets. Gently stimulates peristalsis.

DELICIOUS HEART-OF-WHEAT FLAVOR
Appeals to children and adults.

COOKS IN JUST 10 SECONDS . . . A timesaver meal-planners appreciate.

Ideal in Low-Sodium Diets . . . Naturally low in sodium. No sodium salt added as in some quick-cooking cereals.

AMERICA'S NO. 1 HOT WHOLE WHEAT CEREAL



IT REALLY DOESN'T MATTER
WHICH CAME FIRST . . .

NEOCYTEN

TREATS BOTH PAIN AND SPASM . . .
EFFECTIVELY . . . SIMULTANEOUSLY

NEOCYTEN* combines *potentiated* salicylate therapy with the dramatic muscle-relaxant action of physostigmine—minus its muscarinic effects.

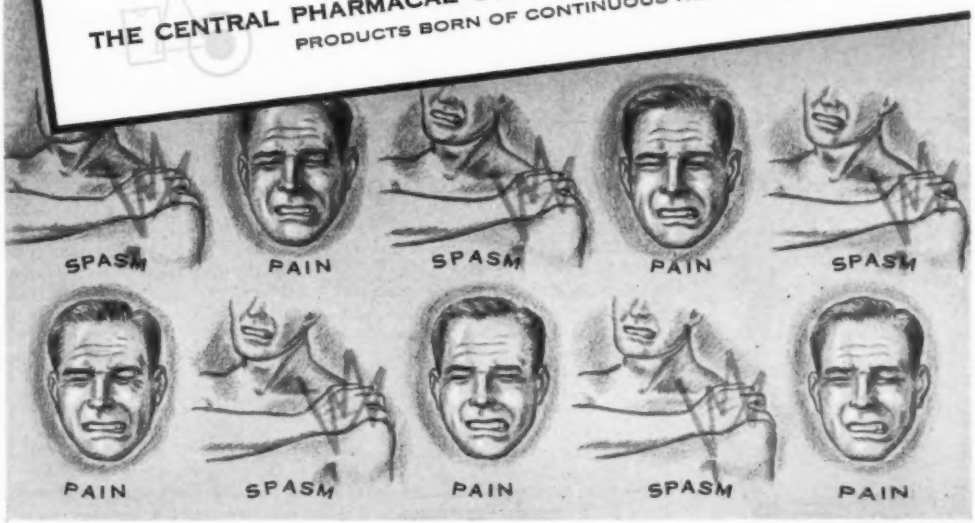
Each ENTAB* (enteric-coated tablet) contains:

Sodium Salicylate	0.25 Gm. (4 gr.)
Para-Aminobenzoic Acid	0.25 Gm. (4 gr.)
Ascorbic Acid	20.0 mg. (1/3 gr.)
Physostigmine Salicylate	0.25 mg. (1/250 gr.)
Homatropine Methylbromide	0.50 mg. (1/120 gr.)

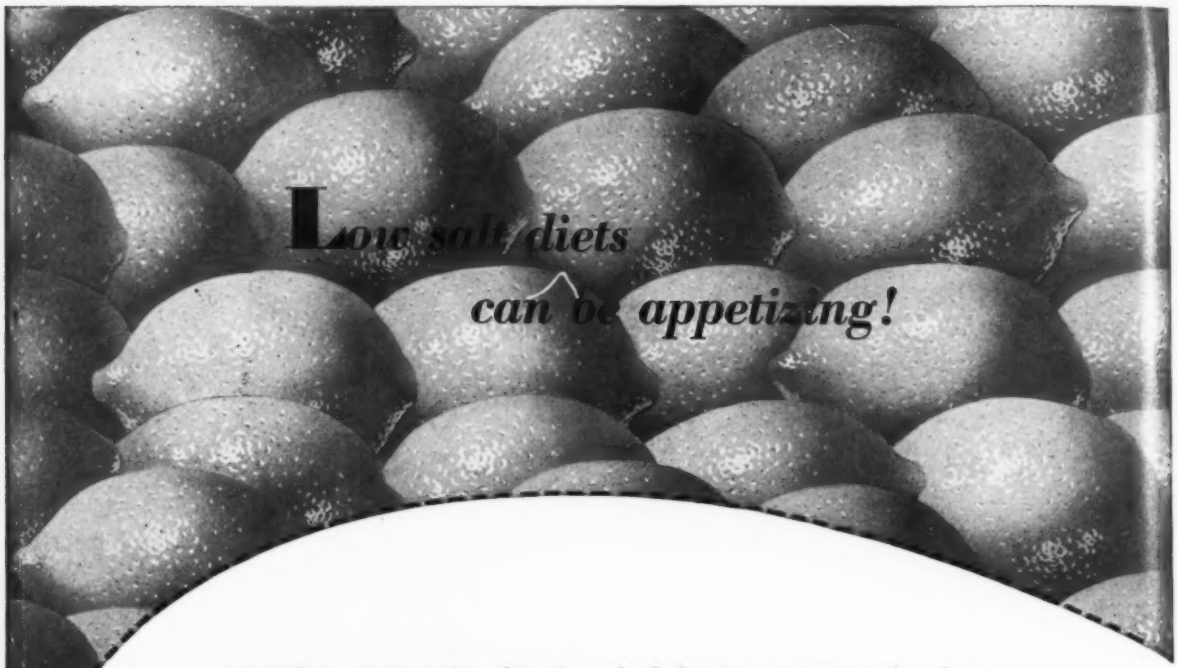
In bottles of 200, 500, and 1000 ENTABS.

Samples and literature available on request

THE CENTRAL PHARMACAL COMPANY • SEYMOUR, INDIANA
PRODUCTS BORN OF CONTINUOUS RESEARCH



*Trademark of The Central Pharmacal Co.



Low salt diets can be appetizing!

A startling new trend in dietetic therapy is the fast-increasing use of fresh lemon juice in sodium-restricted diets. The *real* problem of the low sodium diet, according to doctors and nutritionists, is to keep unsalted foods from tasting flat, insipid.

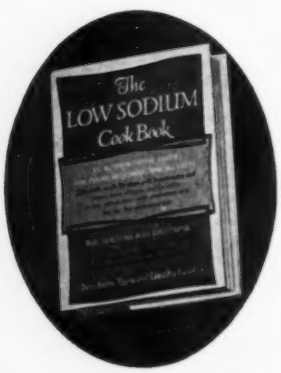
Thousands of patients have found that a good squeeze of fresh lemon juice added at the table transforms tasteless, unsalted foods into tempting, appetizing ones. The sharp tang and aromatic flavor of fresh lemon compensate for the absence of salt. Meats, vegetables, salads—in fact, practically *all* foods—are made more flavorful with tangy, fresh lemon.

Fresh lemon juice has a very favorable sodium-potassium ratio. It has a negligible sodium content (approx. 1 mg per 100 cc), yet is relatively high in potassium (130 mg per 100 cc).

Wherever sodium restriction is advisable, the use of fresh lemon seasoning can be of genuine benefit.

Sunkist *fresh lemons*

SPECIAL OFFER! NEW COOK BOOK FOR LOW SODIUM PATIENTS!



"The Low Sodium Cook Book—Special Sunkist Edition," by Alma Smith Payne and Dorothy Callahan, research dietitian, Massachusetts General Hospital, with introduction by Francis L. Chamberlain, M. D., M. Sc. D.

The cook book has 480 pages and contains hundreds of recipes. It is the most authoritative book of its kind. Available now at the special price of only $1.25 *(regular edition $4.00)*. You are invited to write for copies while the limited supply lasts.

Sunkist Growers
Section M-9310, Terminal Annex
Los Angeles 54, California

Please send me postpaid_____copies of The Low Sodium Cook Book. I enclose $_____
(Send $1.25 for each copy ordered.)

Name_____

Street Address_____

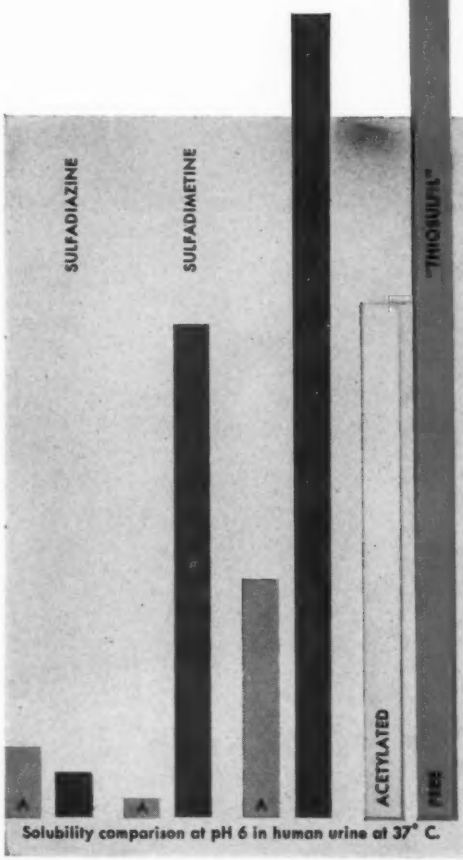
City_____ Zone_____ State_____

SUITABILITY *depends upon* SOLUBILITY

Laboratory studies have demonstrated the greater solubility of "Thiosulfil" as compared with the other three leading sulfonamides prescribed in urinary tract infections.
This obvious advantage, added to high bacteriostatic activity and a low acetylation rate makes

"THIOSULFIL"

the safest and most effective sulfonamide yet presented for urinary tract infections



Solubility comparison at pH 6 in human urine at 37° C.

- Rapid transport to site of infection for early and effective urinary concentration
- Rapid renal clearance
- Minimum toxicity
- Minimum risk of sensitization
- No alkalinization required
- No forcing of fluids

"THIOSULFIL"®

Brand of sulfamethylthiadiazole

SUSPENSION	TABLETS
No. 914 — 0.25 Gm. per 5 cc. Bottles of 4 and 16 fluidounces	No. 785 — 0.25 Gm. per tablet Bottles of 100 and 1,000

New York, N. Y. • Montreal, Canada

Ayerst

5403

simple,
effective
conception control

Ortho

FOR PRODUCTS YOU MUST DEPEND ON

GOMCO EQUIPMENT

QUALITY IS YOUR BEST ECONOMY

IT'S YOURS IN GOMCO® PUMPS

Gomco No. 789
Portable Aspirator

Your safest—and most economical—choice of aspirators is a make that has thoroughly proved itself. And the thousands of Gomco Aspirators in daily use are doing just that.

For we at Gomco *know* there's no short cut to quality. The Gomco pump, built with watchmaker's precision — the Gomco Safety Overflow Valve that prevents overflow damage to the pump — the Gomco overlapping rubber bottle cap that can't work loose — the attractive finish and sturdy gleaming plastic base — are all extra features we include for this reason. We *know* users want aspirators that *won't* be spending time in repair shops — that will last indefinitely — that will be convenient and efficient and quiet in use.

Don't be misled by price or looks. For aspirators you'll be glad you bought years from now, ask for GOMCO.

Suction, Suction-Ether,
and Suction-Pressure Pumps
Thermatic Drainage Pumps
Thoracic Pumps
Aerosol Penicillin Pumps
Dental Aspirators
Tidal Irrigators

GOMCO SURGICAL MANUFACTURING CORP.
830-M East Ferry Street Buffalo 11, New York

introducing:

The new

single prescription

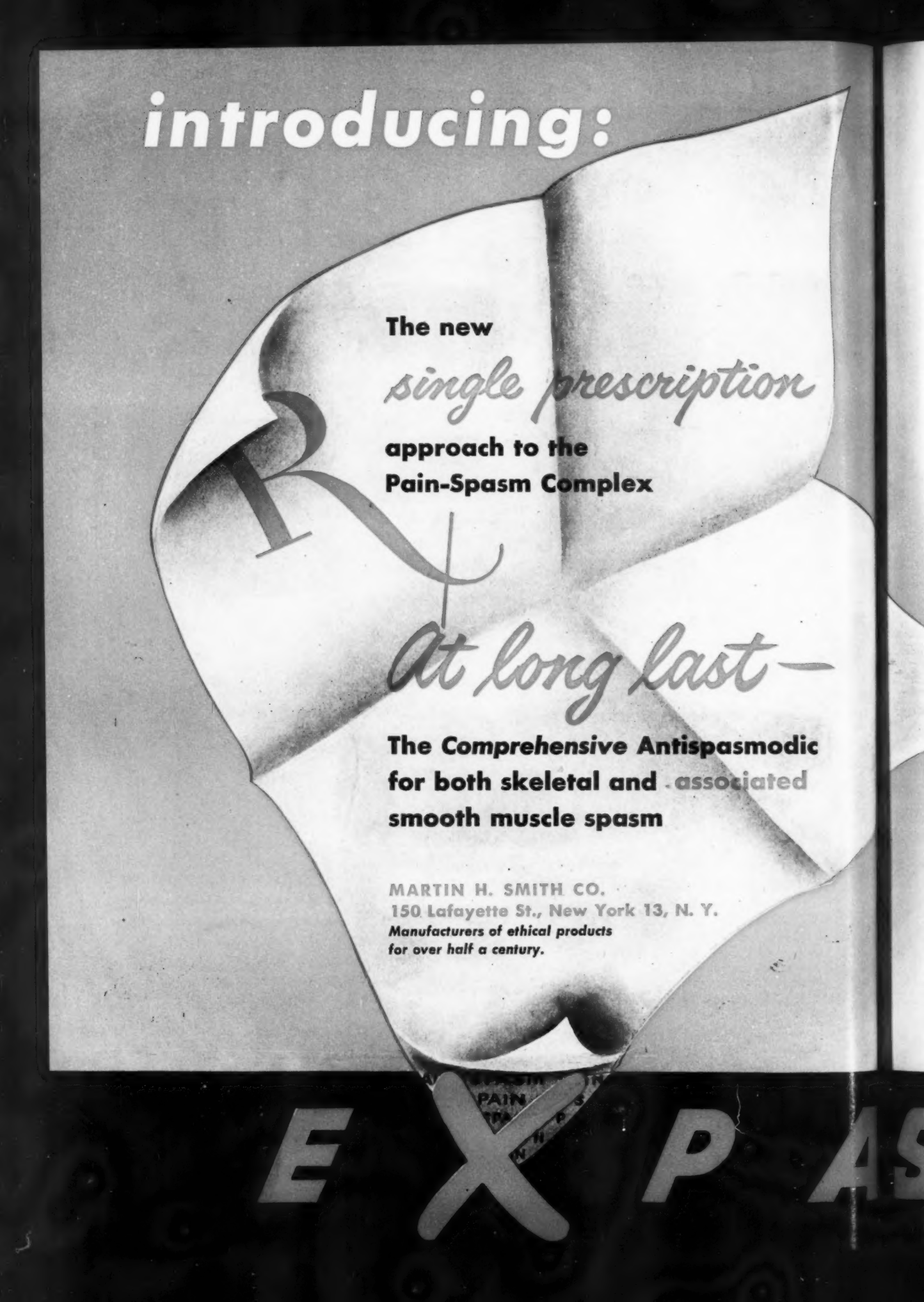
approach to the
Pain-Spasm Complex

℞

at long last—

The *Comprehensive* Antispasmodic for both skeletal and associated smooth muscle spasm

MARTIN H. SMITH CO.
150 Lafayette St., New York 13, N. Y.
Manufacturers of ethical products for over half a century.



EXPASMUS, a *new* combination of antispasmodics, plus a powerful analgesic—in *single-prescription form*—effectively reduces both skeletal and smooth muscle spasm, while affording more rapid release from pain.

Though skeletal muscle *pain-spasm* often engenders secondary smooth muscle spasm, no single antispasmodic preparation free of belladonna, barbiturates or amphetamine has heretofore been formulated to treat both types of spasm. In this respect, Expasmus is unique...as it combines dibenzyl succinate and mephenesin with the powerful analgesic, salicylamide.

As is well known, dibenzyl succinate[1,2,3,4] relaxes smooth muscles without side effects, and is safe even in large doses. Mephenesin[5,6,7,8] offers skeletal muscle relaxation and a sedative effect free from the disadvantages of the barbiturates or the possibility of habit formation. The analgesic action of salicylamide[9,10,11,12] is held to be several times greater than aspirin. These three ingredients have been judiciously combined in Expasmus—to provide safe, fast-acting and comprehensive therapy.

DESCRIPTION: Each tablet of *Expasmus* contains dibenzyl succinate, 125 mg.; mephenesin, 250 mg.; salicylamide, 100 mg. Expasmus is packed in bottles of 100 tablets. On your prescription only.

INDICATIONS and **DOSAGE:** For relaxation of skeletal and associated smooth muscle spasm; relief of arthritic and low back pain; as a mild non-barbiturate sedative and relaxant in tension—Average dose, two tablets every four hours. Maximum daily dose, twelve tablets.

REFERENCES: **1.** New and Nonofficial Remedies 1930. **2.** T. Sollman, "A Manual of Pharmacology" 7th Ed.; W. B. Saunders Co., Philadelphia; 1948. **3.** A. Osol & G. E. Farrar, "The Dispensatory of the U. S." 24th Ed.; J. B. Lippincott Co., Philadelphia; 1950. **4.** "The British Pharmaceutical Codex" 5th Ed.; The Pharmaceutical Press, London; 1949. **5.** R. T. Smith; M. Clin. North America; 33; 1619; 1949. **6.** I. F. Herman & R. T. Smith; Journal-Lancet; 71; 271; 1951. **7.** L. S. Schlan & K. R. Unna; J.A.M.A.; 140; 672; 1949. **8.** W. R. Nesbit; Ind. Med. & Surg.; 21; 599; 1952. **9.** B. E. Benton; Mon. Farm & Terap.; 58; 21; 1952. **10.** A. Kerschensteiner & E. Kusche; Medizinische Monats.; 3; 181; 1953. **11.** E. Lechleitner; Deut. Med. Wochschr.; 76; 1303; 1951. **12.** E. R. Hart; J. Phclgy.; 89; 205; 1947.

SAMPLES AVAILABLE TO PHYSICIANS

Wherever TAR is indicated.....

TARBONIS cream

provides effective control

NON-GREASY • NON-STAINING • COSMETICALLY ACCEPTABLE

Tarbonis supplies the benefits of time-tested tar without its objectionable features—assures patient cooperation.

Easily applied, quickly and completely absorbed into the skin, Tarbonis stops itching and provides rapid relief. It is free of tarry odor, is pleasantly scented, and cosmetically acceptable to the most fastidious. The vanishing cream base permits deeper, more effective penetration without staining or soiling.

INDICATIONS

Eczema, infantile eczema, psoriasis, folliculitis, seborrheic dermatitis, intertrigo, pityriasis, dyshidrosis, tinea cruris, varicose ulcers, and other stubborn dermatoses.

Write today for a clinical trial supply.

AVAILABLE

On prescription from all druggists in 2¼ oz., 8 oz., and 1 lb. jars.

REED & CARNRICK

JERSEY CITY 6. NEW JERSEY

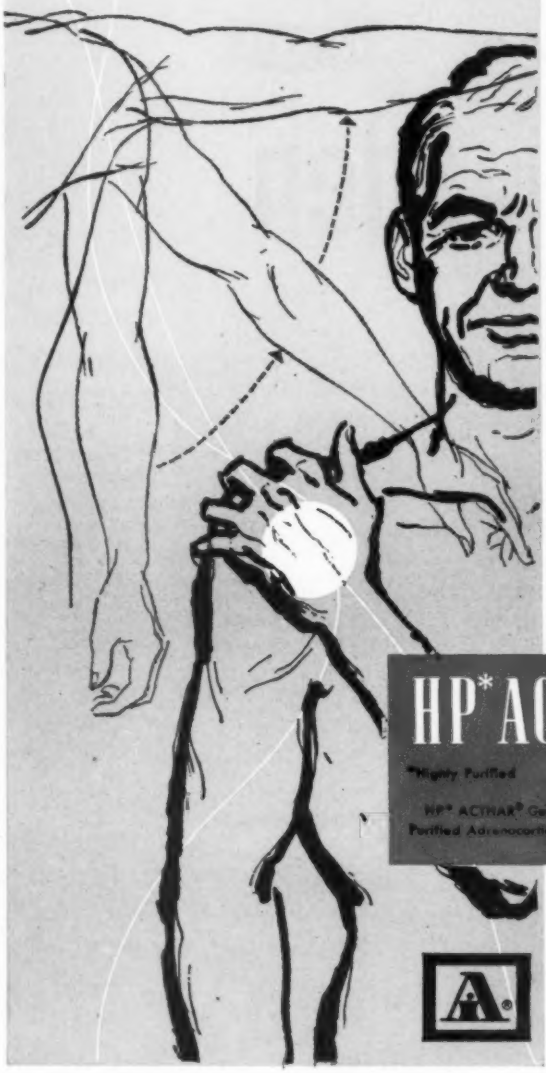
WHEN ITCHING is a severe problem

HISTAR

healing topical analgesic combines antihistaminic and coal tar therapy

PROFOUND RELIEF AND
QUICK REHABILITATION

IN acute bursitis



Profound and rapid therapeutic success in bursitis, especially in the acute stage, is obtained with HP*ACTHAR *Gel*. Cases refractory to other types of therapy have responded to HP*ACTHAR *Gel*, regardless of the severity of the condition. Calcium deposits may disappear.

HP*ACTHAR *Gel*, a new repository ACTHAR with rapid response and sustained action, is as easily administered as insulin with a minimum of discomfort, whether injected intramuscularly or subcutaneously. It is economical too, far less time and money being spent to restore the patient's working ability.

HP*ACTHAR *Gel*
(IN GELATIN)
*Highly Purified
HP* ACTHAR® Gel is The Armour Laboratories Brand of Purified Adrenocorticotropic Hormone—Corticotropin (ACTH).

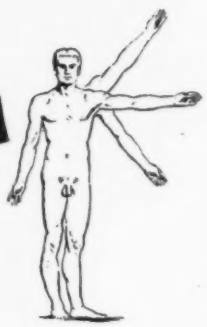
The small total dose required affords economy and virtual freedom from side actions.

THE ARMOUR LABORATORIES
A DIVISION OF ARMOUR AND COMPANY - CHICAGO 11, ILLINOIS

DRAMATIC IMPROVEMENT IN 94.29% OF RHEUMATIC PATIENTS

treated with

Cobaden



In an extensive clinical investigation conducted by five well qualified physicians, treatment with Cobaden, a unique combination of adenosine-5-monophosphate and cyanocobalamin, "... was successful in terms of pain-relief, restored mobility and diminished swelling and tenderness in 66 of 70 patients... with osteoarthritis, polyarticular pain, polyarthritis, tendinitis (bursitis), musculofasciitis, tenosynovitis, peripheral neuritis (sciatica) and diabetic neuropathy."[1]

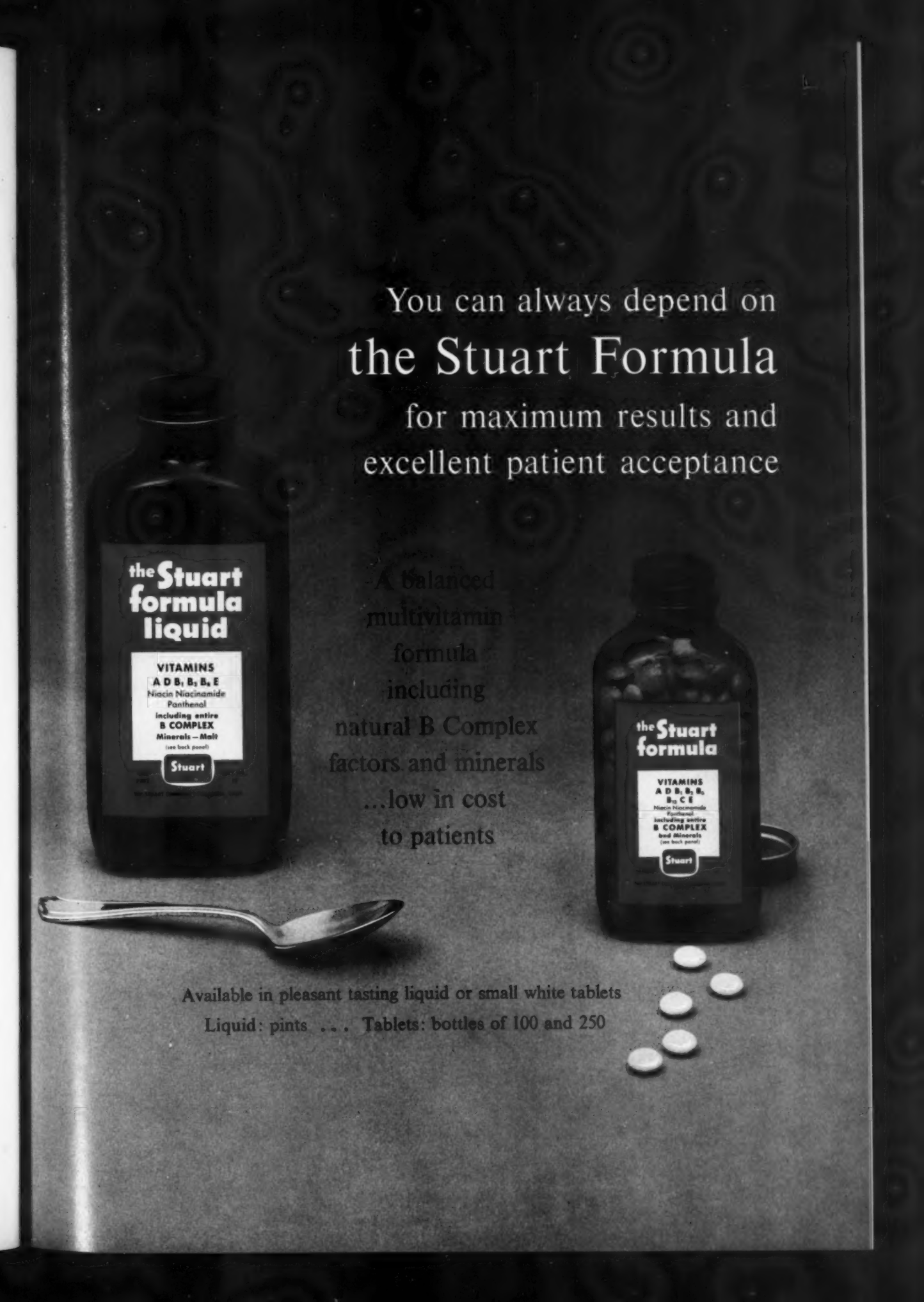
1. De Lucia and Strosberg, Med. Times 82:1, p. 47. 1954.

Each cc. of COBADEN contains:

Adenosine-5-Monophosphoric acid ..... 25 mg.
Cyanocobalamin ..... 60 mcg.
Benzyl Alcohol 1.5%
Injection water q.s.

Rand PHARMACEUTICAL CO., INC.

333 COLUMBIA STREET, RENSSELAER, NEW YORK


You can always depend on
the Stuart Formula
for maximum results and
excellent patient acceptance
A balanced
multivitamin
formula
including
natural B Complex
factors and minerals
...low in cost
to patients
the Stuart formula liquid
VITAMINS
A D B1 B2 B6 E
Niacin Niacinamide
Panthenol
including entire
B COMPLEX
Minerals – Malt
(see back panel)
Stuart
the Stuart formula
VITAMINS
A D B1 B2 B6
B12 C E
Niacin Niacinamide
Panthenol
including entire
B COMPLEX
and Minerals
(see back panel)
Stuart
Available in pleasant tasting liquid or small white tablets
Liquid: pints . . . Tablets: bottles of 100 and 250

a *real* advance in control of rheumatic pain and spasm

greater predictability • greater safety

mephosal®

mephenesin "solubilized"* by sodium salicylate

MEPHOSAL (capsules, tablets, elixir) combines the safe, skeletal-muscle relaxant mephenesin *made freely soluble* by the primary rheumatic analgesic, sodium salicylate—and thus *more readily available.* The result is *predictable,* faster relief from pain and spasm in over 70% of rheumatic patients as against 55% with salicylates alone, and unpredictable relief with comparatively insoluble mephenesin alone.

IMPORTANT—now 3 dosage forms of **MEPHOSAL**—for greater flexibility and convenience.

MEPHOSAL CAPSULES
Broad range, general rheumatic therapy

Each capsule contains:
Mephenesin . . . . . 250 mg.
Sodium Salicylate . . . . . 250 mg.
(does not contain homatropine methylbromide)
Dose: 1 or 2 capsules every 3 or 4 hours.

MEPHOSAL TABLETS
For rheumatic cases with associated g.i. disturbance

Each tablet contains:
Mephenesin . . . . . 125 mg.
Sodium Salicylate . . . . . 125 mg.
Homatropine Methylbromide . . . . 1.25 mg.
Dose: 2 or 3 tablets every 3 or 4 hours.

MEPHOSAL ELIXIR
For rheumatic cases with associated g.i. disturbance

Each teaspoonful (4 cc.) contains:
Mephenesin . . . . . 400 mg.
Sodium Salicylate . . . . . 400 mg.
Homatropine Methylbromide . . . . 2.5 mg.
Dose: 1 teaspoonful every 3 or 4 hours.

Special note: MEPHOSAL TABLETS and MEPHOSAL ELIXIR both contain homatropine methylbromide.

All dosage forms should be given preferably after meals or with a little milk.

There are no real contraindications to the use of MEPHOSAL—no fear of serious toxic reactions—no fear of blood dyscrasias.

Please —when prescribing specify the dosage form clearly.

SAMPLES and literature on request.

CROOKES LABORATORIES, INC. Crookes MINEOLA, N. Y.

Therapeutic Preparations for the Medical Profession

*Patent applied for

when you want RUBBER-ELASTIC specify

You can always count on ACE to provide adequate *body for support* as well as elasticity for compression. ACE Bandages combine rubber and cotton in a "balanced weave" that assures optimal therapeutic results through *uniform* support.

ACE Rubber-Elastic Bandages (5½ yds. fully stretched) are supplied in 2", 2½", 3", 4" and 6" widths. Handy Roller, 2½" wide.

ACE®

ACE Bandages Are Made *Only* By

B-D BECTON, DICKINSON AND COMPANY
RUTHERFORD, N. J.

ACE: TRADEMARK REG. U. S. PAT. OFF.

compare before you prescribe

modern criteria of good digitalis therapy

1. pure active principle
2. complete absorption
3. rapid onset of action
4. smooth, even maintenance
5. frequent dosage readjustment unnecessary
6. virtual freedom from gastric upset

digitaline nativelle®

conforms to the rigid criteria of a modern cardiotonic and provides oral, I.M., and I.V. forms for flexibility of dosage

compare *then prescribe...*

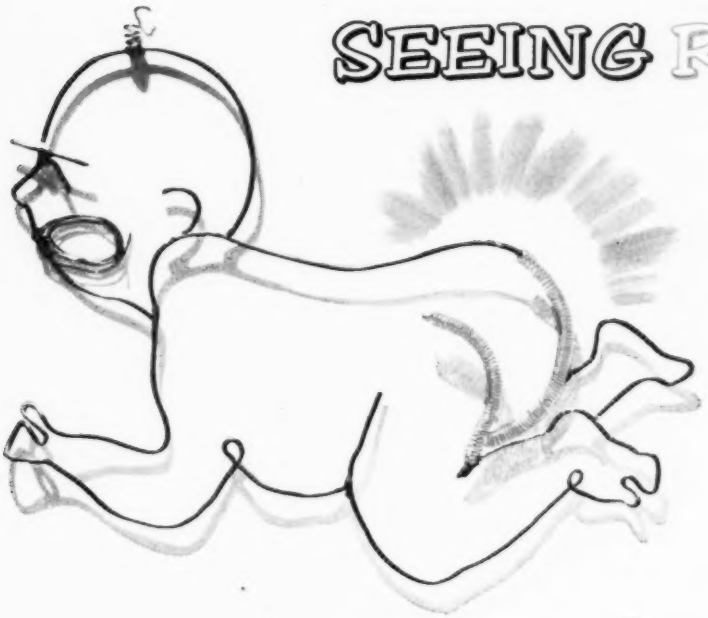
DIGITALINE NATIVELLE

—the original pure crystalline digitoxin

Consult your Physicians' Desk Reference for dosage information.

VARICK PHARMACAL COMPANY, INC.
(Division of E. Fougera & Co., Inc.)
75 Varick Street, New York 13, N. Y.

TIRED OF SEEING RED?



a **Bremil**® *formula*

minimizes **the possibility of excoriations from *Ammoniacal Diaper Dermatitis*... because of its uniquely adjusted content of protein[1] (methionine added) and carbohydrate[2]**

and in addition: **BREMIL *minimizes*** **the possibility of hyperirritability caused by subclinical tetany**

BREMIL *minimizes* **the possibility of digestive upsets**

Conforming to the pattern of breast milk, and containing all nutrients known to be essential for the newborn, including ample "metered" multivitamins, BREMIL is next to breast milk for uneventful feeding

Easy to make (needs only boiled water)... stable... costs less than a penny an ounce — no more than ordinary formulas needing vitamin supplementation

Standard Dilution: **1 level tablespoonful BREMIL and 2 fluidounces cooled boiled water**

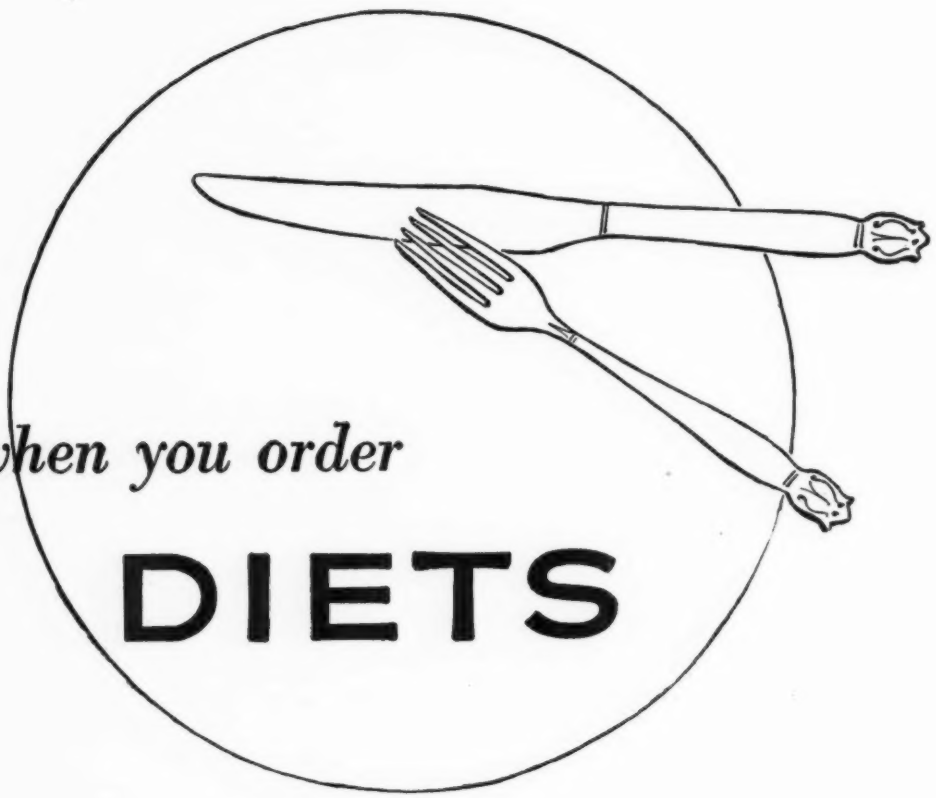
Supplied: **In 1-lb. tins, through all drug channels**

References: 1. Goldstein, L. S.: Clin. Med. 59:455, 1952. 2. Pratt, A. G.: A.M.A. Am. J. Dis. Child. 82:429, 1951.

for samples and literature, write to:

Borden's® **PRESCRIPTION PRODUCTS DIVISION** 350 Madison Avenue, New York 17

Reducing Diets • Diabetic Diets • Geriatric Diets • Postoperative Diets



when you order

DIETS

that limit normal nutrition

Ayerst **New York, N. Y. • Montreal, Canada**

Peptic Ulcer Diets • Low Sodium Diets • Hepatic Disease Diets • Rheumatic Fever Diets

"CLUSIVOL"®

Two capsules (average daily dosage) provide:

Vitamin A (synthetic)	25,000	U.S.P. Units	Biotin	0.1	mg.
Vitamin D (irradiated ergosterol)	2,000	U.S.P. Units	d-Methionine	20.0	mg.
Vitamin C (ascorbic acid)	150.0	mg.	Cobalt—from cobalt sulfate	0.1	mg.
Thiamine mononitrate (B_1)	10.0	mg.	Copper—from copper sulfate	1.0	mg.
Riboflavin (B_2)	5.0	mg.	Fluorine—from calcium fluoride	0.025	mg.
Pyridoxine HCl (B_6)	1.0	mg.	Iron—from 4 gr. ferrous sulfate exsic.	76.2	mg.
Panthenol, equivalent to of calcium pantothenate	10.0	mg.	Calcium—from dicalcium phosphate	165.0	mg.
Vitamin B_{12} U.S.P. (crystalline)	2.0	mcg.	Manganese—from manganous sulfate	1.0	mg.
Folic acid U.S.P.	2.0	mg.	Iodine—from potassium iodide	0.15	mg.
Nicotinamide	100.0	mg.	Molybdenum—from sodium molybdate	0.2	mg.
Vitamin E (as mixed tocopherols natural)	10.0	mg.	Potassium—from potassium sulfate	5.0	mg.
Inositol	30.0	mg.	Zinc—from zinc sulfate	1.2	mg.
Choline—from choline bitartrate	30.0	mg.	Magnesium—from magnesium sulfate	6.0	mg.
			Phosphorus—from dicalcium phosphate	127.4	mg.

No. 293—Supplied in bottles of 100 and 1,000.

prescribe . . .

"CLUSIVOL"®

Ideal Multiple-vitamin preparation for dietary supplementation

5419

ECONOMICAL
You can help young parents save up to $50 on baby's food bill the first year alone—Pet Evaporated Milk costs less than any other form of milk, far less than special infant feeding preparations.
Favored Form of Milk for Infant Formula
PET
HOMOGENIZED
EVAPORATED
MILK

PET MILK COMPANY, ARCADE BUILDING, ST. LOUIS 1, MISSOURI

NOW...

THERAPY IN DEPTH

in angina pectoris... status anginosus

PENTOXYLON—combining the tranquilizing, stress-relieving, bradycrotic effects of Rauwiloid® and the prolonged coronary vasodilating effect of pentaerythritol tetranitrate (usually abbreviated PETN)—provides a completeness of treatment heretofore unavailable to angina patients.

Therapy in depth—a wholly new principle in angina therapy—for the first time encompasses effective treatment for cause-and-effect mechanisms, which goes deeper than the superficial plane of relief afforded by simple coronary vasodilatation.

Pentoxylon is not a substitute for nitroglycerin. Continued therapy with Pentoxylon can be expected to reduce markedly or abolish nitroglycerin requirements, and greatly relieve the apprehension of the patient who lives in continuous dread of the next attack.

Each long-acting tablet of Pentoxylon contains pentaerythritol tetranitrate (PETN) 10 mg. and Rauwiloid 1 mg.

Dosage: one to two tablets q.i.d., usually at mealtime and before retiring.

Available in bottles of 100 tablets.

- Reduces nitroglycerin needs
- Reduces severity of attacks
- Reduces incidence of attacks
- Increases exercise tolerance
- Reduces tachycardia
- Reduces anxiety, allays apprehension
- Lowers blood pressure in hypertensives
- Does not lower blood pressure in normotensives
- Produces objective improvement demonstrable by EKG.

Descriptive brochure on request.

PENTOXYLON™

Another Riker *Original*

RIKER LABORATORIES, INC., LOS ANGELES 48, CALIFORNIA

CONTRATEXIS

...belongs in your office

LANTEEN gives you thoroughly reliable means for conception control—a double barrier to fertilization. Recommend the sure-fitting, easy-fitting LANTEEN flat spring diaphragm. Recommend the safe, rapidly spermicidal LANTEEN jelly. And both as they should be, only yours to recommend.

LANTEEN®

Flat Spring Diaphragm & Jelly

Ricinoleic Acid 0.50%, Hexylresorcinol 0.10%, Chlorothymol 0.0077%, Sodium Benzoate and Glycerin in a Tragacanth Base.

Distributed by GEORGE A. BREON & COMPANY, 1450 Broadway, New York 18, N. Y. Manufactured by

ESTA MEDICAL LABORATORIES, INC., Chicago 38, Illinois

Now

Take Lateral Lumbar Radiographs At 2-Second Exposures With An X-Ray Unit Costing----

EXTRAORDINARY
UNPRECEDENTED
UNPARALLELED
EXCLUSIVE
LOW-COST
UNIQUE

----Only $2595

Yes, this wonderful, low-cost Profexray ROCKET-100 tilt-table unit gives you exposure times up to 400% faster than conventional equipment! It lets you take a fetus at 1 second, a stomach at .3 second.

That's only one of the exclusive advantages of this latest Profexray "first". It's not just a new x-ray unit — it's an entirely new *KIND* of x-ray apparatus. It steps up your x-ray capacity, speeds your radiographic work. And, in spite of these "years-ahead" features (offered ONLY BY PROFEXRAY), it COSTS ONLY $2595!

So — whether you're considering x-ray for the first time, planning to trade in your old unit, or thinking of adding to your current x-ray equipment — don't buy until you know the full facts about Profexray ROCKET-100.

Deliveries now being made — first-come, first-served.

Fill in and mail the coupon RIGHT NOW...

Professional Equipment Co., 1409 N. First Ave., Maywood, Ill.

Rush me full details about the exclusive new Profexray ROCKET-100.

DR._____

ADDRESS_____

CITY, STATE_____

The first modern polio manual

DIAGNOSIS AND TREATMENT OF THE ACUTE PHASE OF POLIOMYELITIS AND ITS COMPLICATIONS

Edited by Albert G. Bower, M.D., with 14 contributors

Complete guide to modern diagnosis, treatment and management, based on 17,000 cases seen at Los Angeles County Hospital. This concise outline of ready reference covers all practical aspects of diagnosis, differential diagnosis, nursing care, dietetic management, physical therapy, orthopedic care, obstetrical complications, the various mechanical devices, the chemical changes in the blood — even the transportation of the patient. Makes quickly available all the essential information you need. Particularly stresses management of cases with respiratory insufficiency.

267 pp. **64 figs.** **$6.50**

Revised and reconstructed 7th edition

FRENCH'S INDEX OF DIFFERENTIAL DIAGNOSIS

Edited by Arthur H. Douthwaite, M.D., F.R.C.P.

Newly compiled edition of this famous treatise on the application of differential diagnosis to all the main signs and symptoms of disease. Covers the whole field of medicine; brings you invaluable aid in determining the precise cause of any symptom of which a patient may complain. New 7th edition includes much new material from many new contributors; all topics extensively revised, many entirely rewritten. Carefully and completely cross-referenced: overlapping held to a minimum in the text, with the well-known and unique index simplified and abbreviated.

1058 pp. **731 figs. (200 in color)** **$20.00**

New light on the etiology of human cancer

CANCER: RACE AND GEOGRAPHY

By Paul E. Steiner, Ph.D., M.D.

Discusses each type of cancer under 4 main heads: racial comparison, comparison of migrants vs. sedentes, racial biological differences, etiological implications. Presents a statistical analysis of all cancers found in a large series of necropsies — and it is possible that, in the long run, the methods used may prove to be as significant as the new facts presented. Some important evidence emerges clearly from the data compiled here, and many challenging indications emerge; however, sufficient details are given for you to recalculate and reinterpret the data wherever you wish.

376 pp. **73 figs.** **$5.00**

Brand-new 2nd edition

HEART A Physiologic and Clinical Study of Cardio-Vascular Diseases

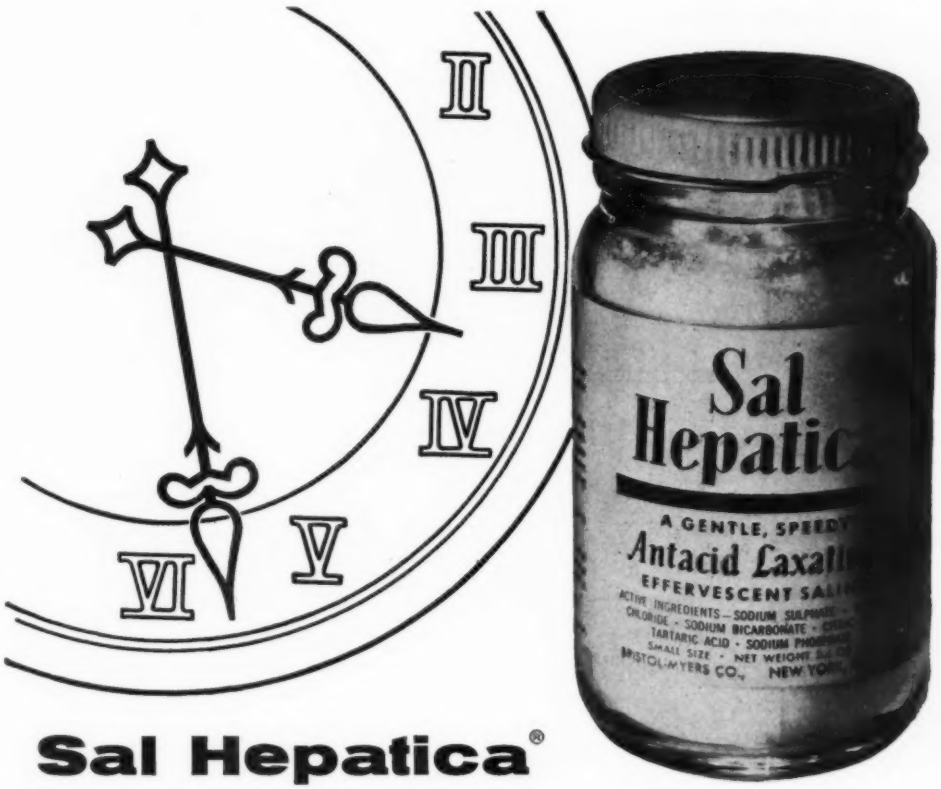
By Aldo A. Luisada, M.D.

Up-to-the-minute review of all the current problems in the field of cardiology. Full and excellent survey of both American and English thought. New chapters added in the 2nd edition; many chapters entirely revised, others brought up to date; many new illustrations. Noteworthy features include the description of the mechanical registration of cardiac action and heart sounds, the reviews of many diseased states with the aid of diagrammatic illustrations, the exceptionally clear presentation of every topic.

694 pp. **312 figs.** **$15.00**

THE WILLIAMS & WILKINS COMPANY

Mt. Royal and Guilford Aves. **Baltimore 2, Maryland**



Sal Hepatica®
Acts So Promptly Because...

SAL HEPATICA'S Action Has a Sound Pharmacologic Basis

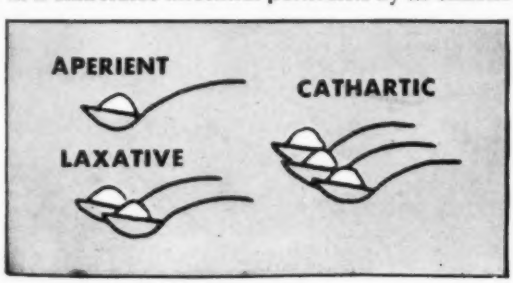
1. It is antacid and effervescent. Reduction of gastric acidity decreases emptying time of the stomach.[1]

Effervescent mixtures also shorten the emptying time.[2]

Thus SAL HEPATICA quickly leaves the stomach to enter the intestine where its laxative action takes place.

2. It stimulates intestinal peristalsis by its osmotic action. The fluid drawn into the intestine is a mechanical stimulus to evacuation, which usually follows promptly.

Prompt, gentle laxation without griping follows the use of pleasant-tasting SAL HEPATICA. The gastric hyperacidity so frequently accompanying constipation is relieved, too, because SAL HEPATICA is antacid.



References: 1. The Physiological Basis of Medical Practice, 1945, p. 486. 2. New England J. Med. 235:80, July 18, 1946.

ANTACID, EFFERVESCENT, SALINE LAXATIVE

BRISTOL-MYERS CO.
19 West 50 Street, New York 20, New York

BEFORE TREATMENT

ECZEMATOID DERMATITIS

AFTER 10 DAYS' TREATMENT WITH VIOFORM

Vioform® CREAM

(IODOCHLORHYDROXYQUIN CIBA)

FOR eczema

Despite the diagnostic complexities of the many forms of eczema—acute, subacute, chronic, infectious, etc., treatment with Vioform Cream or Vioform Ointment is uniformly simple, convenient, and, above all, consistently effective. Vioform has been termed "one of the best antieczematous, mildly soothing . . . remedies."*

Issued: Vioform Cream 3% and Vioform Ointment 3%, 50-Gm. tubes, 1-lb. jars.
Ciba Pharmaceutical Products, Inc.
Summit, N. J.

*Sulzberger, Marion B., and Wolf, J.: Dermatologic Therapy in General Practice, ed. 3, Chicago, Year Book Publishers, Inc., 1948, p. 107.

CIBA

to support the healthy...

Viterra®

a vitamin-mineral formulation of 21 balanced factors, supplementing the depleted diet

each capsule of Viterra contains:

Vitamin A	5,000 U.S.P. Units
Vitamin D	500 U.S.P. Units
Vitamin B_{12}	1 mcg.
Thiamine Hydrochloride	3 mg.
Riboflavin	3 mg.
Pyridoxine Hydrochloride	0.5 mg.
Niacinamide	25 mg.
Ascorbic Acid	50 mg
Calcium Pantothenate	5 mg.
Mixed Tocopherols *(Type IV)*	5 mg.
Calcium	213 mg.
Cobalt	0.1 mg.
Copper	1 mg.
Iodine	0.15 mg.
Iron	10 mg.
Manganese	1 mg.
Magnesium	6 mg.
Molybdenum	0.2 mg.
Phosphorus	165 mg.
Potassium	5 mg.
Zinc	1.2 mg.

to fortify the sick...

Viterra® Therapeutic

high-potency capsules specifically designed to meet increased nutritional needs during illness

each capsule of

Viterra Therapeutic

contains:

Vitamin A	25,000 U.S.P. Units
Vitamin D	1,000 U.S.P. Units
Thiamine Mononitrate	10 mg.
Riboflavin	5 mg.
Vitamin B_{12}	5 mcg.
Niacinamide	100 mg.
Ascorbic Acid	150 mg.
Calcium	103 mg.
Cobalt	0.1 mg.
Copper	1 mg.
Iodine	0.15 mg.
Iron	10 mg.
Magnesium	6 mg.
Manganese	1 mg.
Molybdenum	0.2 mg.
Phosphorus	80 mg.
Potassium	5 mg.
Zinc	1.2 mg.

Roerig Rx

536 Lake Shore Drive,
Chicago 11, Illinois

NEOHYDRIN®

BRAND OF CHLORMERODRIN

NORMAL OUTPUT OF SODIUM AND WATER

Individualized daily dosage of NEOHYDRIN -- 1 to 6 tablets a day as needed -- prevents the recurrent daily sodium and water reaccumulation which may occur with single-dose diuretics. Arbitrary limitation of dosage or rest periods to forestall refractivity are unnecessary. Therapy with NEOHYDRIN need never be interrupted or delayed for therapeutic reasons. Because it curbs sodium retention by inhibiting succinic dehydrogenase in the kidney only, NEOHYDRIN does not cause side actions due to widespread enzyme inhibition in other organs.

Prescribe NEOHYDRIN in bottles of 50 tablets. There are 18.3 mg. of 3-chloromercuri-2-methoxy-propylurea in each tablet.

Leadership in diuretic research

LAKESIDE LABORATORIES, INC · MILWAUKEE 1, WISCONSIN

The Journal of the American Osteopathic Association

PUBLISHED MONTHLY BY THE AMERICAN OSTEOPATHIC ASSOCIATION

Vol. 54, No. 2 | 212 East Ohio St., Chicago 11, Ill. | October, 1954

COPYRIGHT, 1954, BY AMERICAN OSTEOPATHIC ASSOCIATION

Postural Dynamics*

ROBERT B. THOMAS, D.O.†
Huntington, W. Va.

Study of the human body results in the belief that man, like quadrupeds, was at one time intended to walk on all four of his extremities. The higher order of apes finally gained upright posture but continued to assist locomotion with their long arms. The evolutionary process was carried further by man to the point where he walked, and continues to walk, erect on two feet. Human aspiration seems to have exceeded the ability of the skeleton to adapt itself to these changes. The universal complaint of painful afflictions affecting the back and extremities testifies to the fact that the assumption and maintenance of the erect posture is frequently accomplished at great mechanical strain.

In the quadruped, the trunk is supported by four extremities. The spine is propped at both ends and the internal organs suspended by their mesenteries, so that they are strung out like clothes on a washline. The shoulder and hip joints are normally flexed to right angles with the spine.

When man assumed the upright position, a combination of extension at the hip joint and extension of the spine was required to maintain this posture. The dog who attempts to walk on his hind legs illustrates an early step in this evolution. He extends his hips to the utmost, but cannot get them parallel to his spine. In order to maintain a center of balance, he compensates for this inability by arching his back and extending his spine in the lumbar region. Man has evolved a similar mechanism to the point where he can extend his hips well beyond the right angle. However, he continues to require lumbar lordosis to maintain the erect position. This anterior curve of the lumbar area of the spine causes the fifth lumbar to rest upon the first sacral segment at an oblique angle, and the result is a mechanical structure with certain inherent potentials for low-back strain.

The frequency of low-back complaints and the manner of their production may be explained in part by the evolutionary processes involved in attaining the erect posture. An increased mechanical stability of the lumbosacral area is provided by the rotation of the pelvis, so that its obliquity is less pronounced. When this is accomplished in the erect posture, the buttocks are flattened, the hips are more fully extended, and the lumbar spine with its superimposed weight rests upon a sacrum which approaches a more horizontal plane. This in essence is good posture.

The foregoing introduction indicates that the dynamics of good normal or proper posture involves every structure, tissue, and organ comprising the human body. Posture is the result of the integrated and coordinated endeavor of all components of the organism in the recumbent, sitting, and erect positions, including movement in these positions. The posture of the body is dependent upon the position of the joints and is controlled by the skeletal muscles, ligaments, and soft tissues supporting the joints. The function of the supporting musculature in creating movement and maintaining posture within the normal ranges is controlled by the nervous system. The function of the ligaments is complementary to that of the muscles, limiting the extremes of movement and taking the strain when muscles are fatigued or overloaded.

What appears to be a paradox, that muscles both cause movement and prevent it, is easily explained. When a muscle fiber is stimulated, it develops within itself a state of tension, and its subsequent action is subject to conditions external to it. When there is no resistance, the muscle contracts and causes movement; if there is resistance which it is unable to overcome, movement is absent or minimal and the contraction is isometric.

The first process is used to cause motion, the second to maintain posture. The power of a contracting muscle is dependent upon the number of fibers in action. For the maintenance of posture, few muscular fibers are in use at any one time. By a continual change of the contracting fibers, fatigue is kept at a minimum.

Coordinated action of the muscles on each side of a joint is required in maintenance of posture. In the erect position, a preponderant majority of the muscles and joints are involved. The central nervous system regulates this complicated process by the coordination of afferent impulses from the eyes, ears, muscles, skin, and joints with the efferent motor impulses. These postural reflexes are basic in maintaining good posture.

*Presented at the Fifty-Eighth Annual Convention of the American Osteopathic Association, Toronto, July 13, 1954.

†For the presentation of this paper Dr. Thomas received the 1954 Convention Lecturer's Award from the Academy of Applied Osteopathy.

They are, in a majority of instances, conditioned reflexes resulting from an individual's body structure, environment, habits, and occupation.

Any permanent change in an individual's habitual posture is not due to the stimulation to contraction of the muscles on one side of a joint being stronger than that on the other side; rather, it is the effort necessary to hold the body in this new position. To maintain these muscles habitually at different lengths necessitates developing or acquiring a new conditioned reflex or reflexes. Briefly, posture at any given time is dependent upon the position of the joints. This position is developed and maintained by the muscles with their complementary tissues, which, in turn, are controlled by the nervous system.

Maintenance of good posture requires a minimum of muscular effort. Therefore, muscular weakness itself is not usually the cause of postural errors. Frequently muscular weakness is the result of poor posture. The etiologic factor in postural errors may be any one of those which cause a perversion of the postural reflexes themselves. The evaluation of the dynamics of posture requires a knowledge of these factors that has been supplemented by careful study of the physician's experiences and the experiences of others in their management.

Fulton[1] has divided postural reflexes into three categories: (1) local static reactions in which only one part of the body, such as a limb, is involved; (2) segmental static reactions which affect whole segments of the body, both lower extremities, and arm and neck muscles; and (3) general static reactions in which various segments of the body are involved.

The local static reactions are those which tend to affect single extremities, the positive and negative supporting reactions being generally grouped in this category. Experimentally they have been demonstrated in an otherwise intact animal by removal of the cerebellum and application of an adequate stimulus. This stimulus consists of contact with the skin of the foot and separation of the toe pads. The reaction fixes all joints in a rigidly extended posture sufficient to support the animal's weight. The negative supporting reaction is produced by flexing the distal joint of the limb which results in inhibition of the extensor posture just described.

Segmental static reactions are observed when a stimulus applied to one extremity affects the extremity on the opposite side, such as the crossed extensor reflex. General static reactions have to do with reflexes arising in one segment and affecting muscles innervated by other segments such as the labyrinthine and neck reflexes.

It has been determined that both the segmental and general static reactions in man are mediated in the midbrain. However, the postural mechanism in all its phases is influenced by the cerebral cortex and the hopping and placing reactions are dependent upon its integrity.

Maintenance of erect posture by man is dependent upon the integrity of the righting reactions. These consist of a chain of reflexes: (1) labyrinthine-righting reflexes, (2) body-righting reflexes acting upon the head, (3) body-righting reflexes acting upon the body, (4) neck-righting reflexes, and (5) optical righting reflexes. The first three are dependent upon the integrity of the midbrain, the neck-righting reflexes being integrated in the medulla and the optical in the cortex.

It can be observed from this brief and highly abstract discussion of the complicated and extensive influence of the nervous system on posture that perversion of the afferent impulses as a result of disease or injury affecting any area of the body is capable of influencing posture, thereby becoming the primary etiologic factor in production of a postural error. This sequence could, and frequently does, mean ill health for the person involved. The obverse of this statement is that posture can also govern function and frequently may determine the presence or absence of a healthy state in an individual.

The evaluation of the effects of perversions in posture, like all other pathologic processes affecting the human body, is based upon an understanding of so-called normal posture. Normal posture will vary within wide limits as determined by the individual's body build, habits, environment, and occupation. In the main, the concept of average posture is valueless. We can only establish certain basic features which can be observed, measured, or tested in some manner and then make allowances for individual variation. In other words, posture is as much a part of the personality of an individual as is his speech, the movements of his hands, and his facial expression. The evaluation of what is normal or good posture must, in the last analysis, be made on the basis of personal judgment by an experienced observer.

The contribution of the spinal lesion as a *primary etiologic factor* in the production of postural errors is recognized by all of us. The lesion pattern usually dominates the clinical picture in postural disturbances to such a degree that it may become in our thinking, *the etiologic factor*, if we do not constantly remind ourselves, as we study these problems in practice, that the osteopathic spinal lesion can be an effect as well as a cause of postural inadequacies, some of which result from injury or disease. Scoliosis which is a sequel of acute anterior poliomyelitis is a familiar example of altered postural dynamics as the result of disease. The ability of the human skeleton to adapt to these inadequacies to insure maintenance of maximum function and accommodation to its environment is a compensatory mechanism observed in many of these patients. The recognition of problems created by decompensation in these cases emphasizes the necessity of maintaining postural evaluations at the level of the individual patient.

Since the posturing of the hip joints contributes in a large measure to the inclination of the pelvis upon which the spinal column is erected and to determining the rotation of the legs and the posturing of the feet, many methods have been devised to determine the degree of inclination and to establish limits of normal in terms of degrees. Wiles[2] suggests the use of a device called an inclinometer. He arbitrarily selects the posterior superior spines of the ilia and the symphysis pubis as his landmarks for measurement of the inclination. By this method the inclination was established as 31 degrees in males and 28 degrees in females, with variations of up to 4 degrees considered within normal range.

The pelvic inclination is practically absent in infants; at 4 years of age it is 22 degrees in both sexes, and at 7 years, 25 degrees. The adult angle of inclination is reached at the tenth or eleventh year of age, and the variations due to sex begin to appear. Another postural measurement can be obtained by imagining a

perpendicular line erected from the floor through the middle of the external malleolus, the posterior margin of the knee, the greater trochanter, the point of the shoulder, and just posterior to the lobe of the ear.

Studies at Kirksville, especially those of Denslow,[3] Korr,[4] and Thomas,[5] have stimulated several physicians, including myself, to intensified search for criteria which can permit more efficient and practical evaluation of what is good and what is bad in posture. Northup[6] first described and demonstrated the friction test and has used it in many of his clinical presentations. I have described and demonstrated the fibrillation or myoclonia developed by voluntary movement in areas of spinal lesion pathology which result from or produce postural errors. These tests will be described as I discuss an examination designed to assist in the evaluation of an individual's posture.

The prerequisite of a complete and detailed case history has been discussed many times and its value is, I hope, recognized by all. Without the patient's past and present medical history, accurate evaluation of a postural problem becomes impossible. Once this history is completed the scheme of examination should be comprehensive enough to include examination of the whole patient. The patient should be disrobed, since posture cannot be judged with half the body concealed. The presence of an office nurse and the use of a sheet as a shield do much to relieve the embarassment of certain patients during this type of an examination. Mistakes in diagnosis are less likely to result if a regular pattern of examination is developed and followed. The plan of examination follows:

1. Standing
   Body build—posture
   Musculature
   Skeletal—including spine, feet, and legs
   Active movements — flexion, extension, side bending, and rotation
2. Sitting and supine
   Posture
   Active movements
   Hips and lower extremities
   Spine—palpation, tests for motion
   Straight-leg raising
3. Prone
   Passive movements
   Palpation of spine
   Ely's sign
4. Neurologic reflex examination
5. Digital rectal examination

Good light is essential in the room used for postural examination. Daylight supplemented with necessary artificial light properly focused is considered one of the primary essentials.

The patient is first observed in the standing position. The positioning of the bare feet on the floor, the ankles, lower extremities, and hips is observed from the posterior aspect. Areas of localized or generalized edema are noted. The development of the musculature is observed. Next the positioning of the pelvis, the contour of the spine, and the back musculature are studied. The relation of the scapulae to the thoracic area of the spine, the positioning of the arms at the sides, and the musculature of the shoulders are observed. Any deviation from the normal pattern is recorded for special study as the examination progresses. The positioning of the head on the neck and general body carriage are considered. As the patient is viewed from this position an imaginary perpendicular line is erected from the floor, beginning at a point midway between the heels. Normally such a line should bisect the crease of the buttocks, the promontory of the sacrum, the spine of the seventh cervical vertebra, and the occipital protuberance.

The profile study is carried out with many of the points observed above re-evaluated from this aspect of the patient. The posture of the chest and abdomen are noted. Again an imaginary perpendicular line is erected which should bisect the external maleolus, the posterior margin of the knee, the greater trocanter of the femur, the point of the shoulder, and the lobe of the ear.

Deviations are noted and are accounted for as the examination proceeds. In an effort to develop a better visual appreciation of the gross movements of the patient's spine, a skin pencil is used to outline the scapulae and the crests of the ilia, and, as a finger notes the spinous processes of the vertebrae, a line is drawn from above downward, following the course of the palpating finger.

The patient is requested to perform certain active movements. In order to insure a complete view of the back, the subject is asked to clasp his hands behind his neck, permitting the arms to assume the most comfortable position. All motions involving side bending are carried out for one side before those for the opposite side are attempted. The motions used for proper evaluation in side bending should include only the range of movement the patient can accomplish without rotation of the pelvis or bending of the knee. As side bending is carried out, the spinal column should accommodate easily and smoothly to changes in position which are within the limits of normal motion.

The spinal column should present a long sweeping curve as it accommodates to this change in position. Areas in which motion is restricted or absent will present a disruption of this curve and should be noted for further study. Normally, the musculature involved in creating this motion will accommodate to the change in position rhythmically and without effort. In areas exhibiting spinal lesion pathology as the result of postural errors or strains the musculature will not accommodate easily to the change in position. As the motion of side bending is repeated several times, the muscular fibers in areas of involvement will develop fibrillar contractions when the patient returns to the erect or neutral position. This myoclonia will be observed to increase and involve more muscular fibers as the movement is repeated. Frequently, the change from the erect position to side bending will be signaled by a premature contracture of these fibers as they "get set" to change their position. This phenomenon is generally observed after the patient has been required to side bend several times in both directions.

The spine and its supporting structures are observed in flexion, extension, and rotation. Ranges of motion and areas of restriction of motion are noted for a later evaluation of the patient's total postural audit. The muscular and skeletal structures are palpated and areas of tissue tension, increased thermal activity, and bony positional changes are observed.

With the patient in the sitting position his posturing is again observed. Does he sit erect or slumped? How does he posture his legs, feet, hands, and arms?

The friction test observed and described by Northup[6] consists of a downward rapid and firm stroking of the back immediately lateral to the spinous processes on each side with the index and second fingers. The

entire length of the spine is subjected to this test. The following is Dr. Northup's description of this test:

Korr, Denslow, and others have drawn attention to the observation that the osteopathic lesion complex manifests itself through three main physiological components. These are the autonomic, the neuromuscular, and the suprasegmental.

An effort was made to make a practical application of some of these findings. Osteopathic physicians have for years reported changes in skin texture and skin temperature over and near so-called "lesioned areas." Detection depends on the examiner's perceptive ability and his sensitivity of touch. Thus the results of such examinations are both valuable and variable.

It is believed that the vasomotor response of the skin is under the control of the sympathetic nervous system. Osteopathic spinal lesions are thought to affect vasomotor tonus through effects on the sympathetic nervous system. If this is true, changes in the vasomotor tonus should be observable in the dermatomes overlying or near the lesioned segment involved. This is probably the mechanism responsible for changes in skin temperature reported in these areas.

Friction, through an antidromic reflex, causes changes in vasamotor tonus, particularly in the capillaries of the skin. Therefore, it seemed logical to use friction as a means to elicit already established differences in tonus. In particular, it was thought to be useful in demonstrating changes in sympathetic activity produced by osteopathic spinal lesions.

The technic of the test is simple. The index and middle finger of the examiner's hand are placed on the skin, straddling the spinous processes of the vertebra. These two fingers of the hand are placed in the suboccipital fossa. They are then brought down with firm, even pressure to about the level of the tenth vertebra. This firm stroking motion is repeated several times until an erythema is exhibited on either side. The operator then stands back and watches the "pattern" develop. In a matter of a minute certain observations can be made. Some areas of erythema will persist while other areas quickly fade. Other areas may show marked blanching of the skin instead of the usual persistence of erythema. Both types of reactions may be diffuse or sharply localized.

The same technic is employed from about the level of the tenth thoracic vertebra down over the sacrum. For some reason not fully understood, the vasomotor response from that level down requires considerably more friction to elicit a response. Therefore, the frictional erythema test is performed in two parts.

From practical experience of about 4 years, I have found this test to be most useful. The types of reactions noted are not so easily explained. It is sufficient to report at this time that there is a difference in the erythematous response over segmental dermatome areas related to obvious osteopathic spinal lesions and over areas where spinal lesions are less easily diagnosed by palpation.

It does appear from basic available information concerning the sympathetic nervous system that the blanching type of response to this test is regarded as evidence of increased activity of that part of the sympathetic nervous system supplying the skin area which has elicited the response. An increased erythematous reaction tends to point to exhaustion or fatigue of the sympathetic centers supplying the area of persisting and increased erythema.

The response elicited to this test does not always seem to be due to the osteopathic lesion complex alone. Visceral disease apparently may manifest itself in a similar manner. It is my opinion that, as this test is more widely employed, it will prove useful not only in the diagnosis and evaluation of osteopathic spinal lesions, but as a general diagnostic aid as well.

Korr and his associates[4,5] have developed experimental equipment to develop further the research and clinical possibilities of this test. The results to date seem to conform with those observed clinically.

The functional erythema test is an aid to the diagnosis of abnormal areas of sympathetic activity in the various dermatome areas noted. It is proposed that it is a significant and simple method of quickly locating areas of osteopathic spinal lesioning and may often direct attention to otherwise asymptomatic visceral conditions. Future observations of the Kirksville Research Program and of other clinicians should be noted with interest.

Palpation of the spinal column and adjacent tissues is again carried out to determine areas which will later require attention from the standpoint of therapy. As the patient assumes the supine position, the observer notes the posture he adopts. Unconscious or conscious exaggeration of his symptoms may be betrayed by the method in which he assumes the position or how he lies once the position is assumed. For example, a patient who claims to be unable to extend his lower back may lie down with his knees and hips flexed and lumbar spine extended.

To determine further the stability of the lumbosacral and sacroiliac joint the straight-leg raising test is employed with the patient in the supine position. Pain produced by this test is indicative of a pathologic process in the areas mentioned. Normally the leg can be raised to a 90-degree angle with the pelvis without pain.

The accommodation of the back to the firm surface of the examining table is of value in determining the mobility of the spinal segments. Ability to lie flat on the table without a pillow supporting the head is indicative of normal accommodation to the supine posture.

Since limitation of movement in the hips affects spinal postures, passive movements are employed both in the supine and prone positions to determine if the range of motion is within normal limits.

Ely's sign is elicited with the patient in the prone position. The leg is flexed at the knee until the heel touches or approximates the buttocks. This movement stretches the anterior muscles of the thigh. Normally the pelvis will rotate forward on the side of flexion, increasing the lumbar curve. When the sign is positive, the pelvis rises from the table in posterior rotation, indicating restriction of movement in the lumbar spine or sacroiliac joint or both.

The movements of the individual vertebral joints, except the cervical, are tested with the patient in the prone position. The muscular tone of the spinal muscles is again evaluated with the patient at rest.

The movement of the joints of the cervical area and the integrity of the associated musculature are tested by passive movements of the head with the patient supine. It will be observed that, in the normal patient, the range of motion is greater than in the standing or sitting positions. Rotation of the head on the neck should be at least 90 degrees, and sidebending should permit the patient to touch the ear to his shoulder.

The neurologic examination should include the usual reflex tests plus observation of those postural reflexes which have been observed to occur with sufficient regularity to make their study of more significance than mere academic interest.

The postural reflexes and reactions of Magnus and de Kleyn have been further studied and developed by Schilder and Hoff.[1] There are four tests involving the posturing of the upper extremities which are mentioned as a matter of information and the potential value they may assume in the total postural evaluation of a patient. The reactions described are those of a normal individual. Under certain pathologic conditions exaggeration of the reflex movements will be noted.

1. The patient stands with his eyes closed and his arms and hands outstretched with the first finger of each hand approximating but not touching the corresponding fingertips of the examiner's hands. In about

30 to 45 seconds, a lateral deviation of the patient's arms and hands will occur.

2. This concerns elicitation of a deviation of the outstretched hands of the subject upon passive rotation of the head and neck. The upper extremity on the side to which the head is being turned moves into moderate extension.

3. The patient's hands stretched out in supination tend to pronate after 30 to 45 seconds.

4. The fourth test concerns the factors of proprioception and body image. The patient stands with his eyes closed and with one arm outstretched below the horizontal plane for 30 seconds. He is then asked to raise the other arm to the same level and this arm is tested. The same test is repeated, first with one arm and then the second arm outstretched above the horizontal plane. A slight amount of overshooting or undershooting is normal and is related to the amount of fatigue developed.

It is to be emphasized that these reactions must be observed and recorded many times by different observers before consistency is finally proved and their value as diagnostic aids established.

Remedial measures instituted to correct postural errors or defects or to adapt the posture to the best compensatory advantage for the patient must be prescribed at the individual level.

When evident psychologic blocks exist, it becomes necessary to investigate the emotional balance of the patient by a study of the environmental factors under which he works, lives, and plays. There should be no hesitation on the part of the physician in calling for a consultation necessary to insure the full understanding of the patient's problems and his cooperation in whatever program of treatment is developed.

Corrective or remedial treatment may fall into one or more of these approaches:

1. Restoration of mobility to permit correction of the postural error.

2. Development of voluntary control over those movements which tend to produce correction.

3. Conscious positioning and exercises designed to establish new postural reflexes.

CONCLUSIONS

This brief review of postural dynamics is designed to encourage each of us to develop the interest, the curiosity, and the background for a serious analysis of our own methods of approach to the problems met in the examination and evaluation of postural errors or defects. It will be noted that considerable time has been spent developing the hypothesis that normal posture finally must be determined at the personal level after all factors influencing posture have been considered and evaluated for the individual concerned.

826-827 First Huntington
National Bank Bldg.

REFERENCES

1. Fulton, J. F.: Physiology of nervous system. Ed. 3. Oxford University Press, New York, 1949.

2. Wiles, P.: Essentials of orthopaedics. Blakiston Co., Philadelphia, 1949.

3. Denslow, J. S., Pearson, J., and Gutensohn, O.: Approach to skeletal components in health and disease. J. Am. Osteop. A. 50:399-403, April 1951.

4. Korr, I. M.: Three fundamental problems in osteopathic research. J. Am. Osteop. A. 50:407-416, April 1951.

5. Thomas, P. E.: Approach to analysis of spinal stress through its physiological manifestations. J. Am. Osteop. A. 50:403-407, April 1951.

6. Northup, G. W.: Personal communication.

ADDITIONAL REFERENCES

Denslow, J. S., and Clough, G. H.: Reflex activity in spinal extensors. J. Neurophysiol. 4:430-437, Sept. 1941.

Eggleston, A. A.: Posture and perverted physiology. J. Am. Osteop. A. 48:553-560, July 1949.

Hyman, H. T.: Integrated practice of medicine. Vol. III. W. B. Saunders Co., Philadelphia, 1946.

Pullen, R. L., ed.: Medical diagnosis. W. B. Saunders Co., Philadelphia, 1944.

Preventive medicine of tomorrow. J. Osteop. 16:15-21, May 1949.

Research; ten years of progress. J. Osteop. 16:14-22, Feb. 1949.

"OUR STRONGEST REASSURANCE IS THE INTEGRITY OF OUR INSTITUTIONS."

Primitive man fulfilled his simple wants by sharing in such bounty as nature placed before him. His choice was limited—by climate, terrain, or accessibility. He used from his environment what he could adapt most readily to his need.

As a guide he had only the stern process of trial and error. He ate what seemed edible. He clothed himself in what seemed appropriate to his warmth, comfort or modesty. His mistakes were numerous and often catastrophic. How many sacrifices were required to teach us that water must remain undefiled? How many died of eating the mushroom *Amanita verna* before we realized that some of nature's fruits are bitter but nutritious; others tasty but treacherously deadly? How many thatched their huts with poisonous vines or contaminated their skins with toxic materials before the slow accumulation of man's experience fixed firmer guideposts?

Today our needs are complex. Our choices are wide and grow ever wider under the inventive hand of our people. As consumer and producer, we are concerned with new materials, new methods, following one another in bewildering succession.

These new developments add much to our way of living, to our enjoyment and our convenience. Yet, it is true that as we probe further and further into the unknown for new miracles, we find also new perils and new hazards. Further, we now set values on human life, on health, and even on comfort far beyond those of past centuries.

Public protection thus becomes a primary duty and obligation. In so complex a society, it is a complex problem. Laws are passed and codes and regulations are established. Yet our laws can only proscribe obvious abuses and provide the machinery to punish wrong-doers. In an industrial civilization we rely most upon the reputation and the high technical qualification of those who make and process the familiar articles of commerce. Our strongest reassurance is the integrity of our institutions.—Foreword, Protecting the Public Health. E. I. du Pont de Nemours and Company, Wilmington, Del., 1954.

Journal A.O.A.
October, 1954

The Role of Local Thrombocytopenia as a Cause of Menorrhagia

A Report of Six Cases

GEORGE E. HIMES, D.O.
TOINE M. RINNE, D.O.
and
VIRGINIA M. HAMMEL, B.A., M.T.
Flint, Mich.

There have been many cases described in the literature in which thrombocytopenia was manifested only by abnormal or excessive bleeding from one or more of the body orifices. It has long been common knowledge that the platelet count of the blood is reduced prior to the menses and reaches its maximum reduction shortly after their onset.[1] Stefanini and his associates[2] have shown immune body formation to the platelets in certain patients. The diagnosis of this has been made a simple procedure which is known as platelet agglutination.[3] Platelets are now classified into five major groups according to antigenic structure.[2,3] The platelet groups have the same significance as the erythrocyte groups. Thus far, groups I, II, III, IV, and O have been isolated and conclusively proved by the finding of normally occurring antibodies.[2-5]

The advent of the Coombs' test, which demonstrates the presence of an autoimmune or an isoimmune antibody occurring in the human blood as the result of sensitization to a particular antigen, has opened up wide possibilities in the differential diagnosis of not only the thrombocytopenic purpuras but also the hemolytic anemias and other obscure disease entities which are of an antigen-antibody nature. There are many factors which are involved in the production of an immune body, and why an individual should develop an immune body which reacts with his own platelets is not clearly understood any more than why an individual with hemolytic anemia develops an immune body to his own red cells. Very frequently, however, these individuals who develop an autoimmune state are individuals who have taken medication of one type or another for long periods. The most important of these medications are: Sedormid,[6-8] quinidine,[9-11] aminopyrine,[12] and Marbadal.[12] These substances produce thrombocytopenic states. They act as a partial antigen or hapten[12] which combines with platelets to form an antigen which is entirely different from the substance administered or that which was present in the body prior to its administration.

Usually the initial dosage and the first course of therapy with a given drug do not produce thrombocytopenia. However, even minute doses of these drugs on subsequent administration, after sensitization of the individual, result in marked thrombocytopenia owing to the combination of a platelet-drug antibody in the serum, which in the presence of complement results in subsequent lysis of the platelets. In general, thrombocytopenia disappears as soon as the offending drug has been eliminated from the body. Other drugs may cause thrombocytopenia but in such cases thrombocytopenia results in general rather than local purpuras. They have a depressing effect on the bone marrow in which the neutrophils as well as the platelets are depressed.

Local thrombocytopenia as the cause of menorrhagia with each menstrual period and subsequent anemia is usually diagnosed only after the physician has treated the patient without improvement and seeks consultation. Usually the patients have had two or more diagnostic curettages which are quite unrevealing to the pathologist. As a rule, the patients are anemic from prolonged blood loss and show hypochromic microcytic anemia of iron deficiency from the chronic blood loss. Platelet counts, to be indicative at all, must be done by the indirect method of Dameshek, and each count for the same patient should be done by the same individual.

The platelet count should be taken midway between menstrual periods for the purpose of establishing a normal level for the individual. As the time of the menses approaches, the platelet count should be taken approximately every other day at the same time of the day and in the same relationship to meals so that the results will be comparable. A reduction from the midcycle count by a hundred thousand or more is significant and suggestive of thrombocytopenia due to a local immune body response. An indirect Coombs' test should be made, and a platelet agglutination test should be performed to demonstrate any circulating platelet antibody. In all of our cases the Coombs' test has been positive. The platelets are usually decreased at the time of the menses by 125,000 or more.

Some patients not only show an isoplatelet antibody but also show an isoerythrocyte antibody and have a hemolytic anemia with elevation of the serum bilirubin and increased erythrocyte fragility as well. Still other patients show a thrombotic[13,14] tendency in which they have multiple venous thromboses in various parts of the body, accompanied by severe pain. These patients are very frequently placed on anticoagulant therapy which results in massive hemorrhages from the gastrointestinal and genitourinary tracts. It is frequently necessary to transfuse fresh whole blood to stop the flow of blood and correct the deficiencies of the clotting mechanism. This particular type of individual usually has abnormal platelets, and bone marrow studies show an excessive number of megakaryocytes, many of which are abnormal.

At the present time, the aim of treatment of this particular syndrome of allied disorders of the clotting mechanism is to depress the antibody formation by the use of cortisone or ACTH, whichever is more effective in the particular patient. Use of ACTH is governed by the response obtained in

TABLE I—SUMMARY OF CLINICAL FINDINGS AND PRIOR TREATMENT

Patient	Age	Symptoms	Prior Treatment	Results	Family History
1	24	Anemia, menorrhagia	Liver twice a week for 1 year; ferrous sulfate, 15 grains daily for 1 year; three curettages	None	"Mother had tired blood and difficult periods."
2	19	Anemia, menorrhagia	None	None	Sister of patient No. 1
3	28	Painful, hard subcutaneous nodules (migrant); menorrhagia	Anticoagulants for 3 months; antibiotics for 1 month	None	Noncontributory
4	36	Menorrhagia and metrorrhagia, 5 years	Three curettages; hormones (estrogen and progesterone)	None	Mother and two sisters had hysterectomies for same symptoms
5	30	Menorrhagia, 3 years	Hormones (estrogen and progesterone); two curettages	None	Mother and aunt had same symptoms
6	27	Anemia, menorrhagia, 2 years	Hormones (estrogen, progesterone, and androgens); one curettage	None	Noncontributory

the eosinophil count to a 25-mg. dose of ACTH. If the eosinophil count is lowered by half after a 25-mg. dose, it is considered that the adrenal cortex has the ability to respond to ACTH with the production of cortisone. However, if there is no eosinophil count to begin with or if there is no response in the eosinophil count to ACTH, then cortisone should be used and the initial dosage should be relatively high. The dosage should be reduced as the patient shows signs of sodium and water retention. This can best be noted clinically by having the patient record her weight every day at the same time. An increase of 3 to 5 lbs. in weight in 1 week usually indicates that the dose of cortisone or ACTH is too high. If the facilities are available, control sodium and chloride determinations can be done on the blood and the sodium and chloride levels can then be determined at weekly or biweekly intervals to ascertain whether or not there is excessive retention. The patient must also be watched for the development of infection and, at the first sign of infection, therapy should be stopped. All other medications should be stopped before treatment is initiated, particularly those which are related to the drugs previously mentioned.

In general, the patient responds very well to this therapy, and after 6 to 12 weeks, it can be discontinued. Usually there is no recurrence of the circulating antibody unless there is a resumption of the previous medications. The response to antianemic therapy in many of these cases is dramatic, the hemoglobin showing a rise in excess of 1 gram per week. This is usually most gratifying to both patient and physician as the patient immediately feels better and the physician sees a response where formerly the only effects from large quantities of liver extract and iron were gastrointestinal irritation and the usual nervous system irritation from subcutaneous and intramuscular injection.

Table I is a summary of the clinical findings of each of the six patients. The principal complaint was menorrhagia in each case. Other complaints were related to anemia and varied from fatigue on exertion to fatigue at rest. Four patients presented a history of similar disease in mothers or sisters. Treatment was directed toward stopping the excessive blood loss and reversing the iron deficiency. Patient 3, in addition, presented a thrombotic thrombasthenia which was most troublesome to her.

Table II is a summary of pretreatment laboratory findings. The platelet counts were within normal range in every case at the midinterval phase of the menstrual cycle. During the first days of the menses there was a decided drop in the platelet counts. The morphology of the platelets was normal except in patient 3, whose platelets were from 6 to 10 micra in diameter. Platelet agglutinins were present in every case. Prothrombin times, prothrombin consumption tests, tests

TABLE II—LABORATORY FINDINGS BEFORE TREATMENT

Patient	Indirect Coombs'	Platelet Counts/cu.mm. Midcycle	Menses	Platelet Morphology	Hemoglobin grams/100 ml.	Red blood cells
1	Positive	378,000	178,000	Normal	6.8	2,700,000
2	Positive	250,000	150,000	Normal	10.0	3,500,000
3	Positive	290,000	168,000	Giant Platelets	5.0	1,700,000
4	Positive	400,000	200,000	Normal	10.8	3,400,000
5	Positive	270,000	210,000	Normal	9.2	3,100,000
6	Positive	315,000	200,000	Normal	10.4	3,500,000

TABLE III—LABORATORY FINDINGS AFTER TREATMENT

Patient	Treatment	Indirect Coombs'	Platelet Counts/cu.mm. Midcycle	Menses	Hemoglobin grams/100 ml.
1	100 mg. cortisone/day for 2 weeks; 50 mg./day for 3 months	Negative	400,000	350,000	13.0
2	100 mg. cortisone/day for 1 week; 50 mg./day for 3 months	Negative	350,000	315,000	14.0
3	200 mg. cortisone/day for 2 weeks; 50 mg./day for 3 months	Negative	500,000	390,000	11.6
4	100 mg. cortisone/day for 1 week; 50 mg./day for 2 months	Negative	425,000	370,000	14.2
5	100 mg. cortisone/day for 1 month; 50 mg./day for 2 months	Negative	425,000	390,000	11.5
6	200 mg. cortisone/day for 2 weeks; 100 mg./day for 2 months	Negative	390,000	350,000	13.2

for antihemophilic globulin, Christmas and Rosenthal factors were not abnormal. All patients were anemic, and their blood presented a hypochromic microcytic morphology on the stained smears.

Table III is a summary of treatment and laboratory findings after cessation of treatment. As would be expected, the dosage of cortisone was variable for each patient. The indirect Coombs' test was negative, and the platelet counts were within normal ranges. The most surprising effect was the increase in hemoglobin without specific iron and liver therapy. In those patients who have received cortisone or ACTH for any length of time, the hemoglobin level usually drops as the result of hydremic plethora from sodium retention. It is probable that a hemolytic anemia was also present to account for some of the iron deficiency states. None of the patients menstruated earlier than 5 weeks after the institution of therapy. All menstruated by the seventh week and have continued with normal cycles up to the present time.

SUMMARY AND CONCLUSIONS

1. A summary of the literature concerning immune thrombocytopenias has been presented.

2. Six patients presenting immune isoantibodies to their own platelets have been described. Each apparently also had associated hemolytic anemia.

3. Treatment of these patients with cortisone has been described.

4. Progress to date is described and appears to be favorable; apparently cortisone suppresses the formation of immune bodies.

ACKNOWLEDGMENT

The authors are grateful to the attending staff of the Departments of Obstetrics, Gynecology, and Medicine of Flint Osteopathic Hospital for the opportunity to study and present these cases. The laboratory staff was most helpful in establishing the diagnosis and following treatment.

Flint Osteopathic Hospital
446 W. Fourth Ave.

REFERENCES

1. Bernfeld, P., and Stefanini, M.: Characteristic electrophoretic patterns in hemophilia and idiopathic thrombocytopenia. Proc. Soc. Exper. Biol. & Med. 77:551-553, July, 1951.

2. Stefanini, M., *et al.*: Studies on platelets; antigenicity of platelets and evidence of platelet groups and types in man. J. Lab. & Clin. Med. 42:723-738, Nov. 1953.

3. Harrington, W. J., *et al.*: Immunologic mechanisms in idiopathic and neonatal thrombocytopenic purpura. Ann. Int. Med. 38:433-469, March 1953.

4. Sprague, C. C., *et al.*: Platelet transfusions and pathogenesis of idiopathic thrombocytopenic purpura. J. Am. M. A. 150:1193-1198, Nov. 22, 1952.

5. Stefanini, M., Dameshek, W., and Adelson, E.: Platelets; shortened "platelet survival time" and development of platelet agglutinins following multiple platelet transfusions. Proc. Soc. Exper. Biol. & Med. 80:230-235, June 1952.

6. Belloni, F.: Mechanism of Sedormid purpura. Quart. Rev. Allergy 6:112, 1952.

7. Ackroyd, J. F.: Role of complement in Sedormid purpura. Clin. Sc. 10:185-207, May 1951.

8. Ackroyd, J. F.: Mechanism of reduction of clot retraction by Sedormid in blood of patients who have recovered from Sedormid purpura. Clin. Sc. 8:235-267, Dec. 1949.

9. Lipson, L.: Purpura due to quinidine. New York State J. Med. 52:586-587, March 1, 1952.

10. Larson, R. K.: Mechanism of quinidine purpura. Blood 8:16-25, Jan. 1953.

11. Nussbaum, H. E., and Schulman, M. W.: Thrombocytopenic purpura following quinidine therapy. Ann. Int. Med. 37:190-194, July 1952.

12. Kiep, L. C.: Akute Thrombopenie als medikamentallergische Reaktion gegen Pyramidon und Marbadal. Deutsche med. Wchnschr. (Allergie-Biel.) 77:9-11, Aug. 15, 1952.

13. Singer, K., Motulsky, A. G., and Shanberge, J. N.: Thrombotic thrombocytopenic purpura; studies on hemolytic syndrome in this disease. Blood 5:434-448, May 1950.

14. Singer, K., Bornstein, F. P., and Wile, S. A.: Thrombotic thrombocytopenic purpura; hemorrhagic diathesis with generalized platelet thromboses. Blood 2:542-554, Nov. 1947.

Notes Concerning the Duoetiology of Disease

Relation of Certain Gram Negative Bacilli to Brucellosis and Brucella-Like Infections

The Department of Bacteriology and Public Health
The Kansas City College of Osteopathy and Surgery
Richard G. Taylor, B.S., A.M., Chairman
Patrick Martin, B.S., M.S.
M. T. Pritchard, B.A., M.P.H.
J. Eugene Mielcarek, B.S., M.S.
James L. Rowland, B.A., M.P.H.

THEORETIC AND HISTORIC

The trend of scientific approach to bacteriology since the time of Pasteur and Koch has been toward the monoetiology of disease. Modern investigation clearly rests upon the generalization that may be made from this fact, the concept of specific microbial etiology. A diseased animal may, and usually does, harbor a variety of micro-organisms. However, the responsibility for a given phenomenon has, in many cases, been fixed upon but one kind of bacterium present in this naturally occurring mixture with no apparent significance attached to the remainder. It is true that the great majority of infectious diseases are conditions of this type, and it is possible, therefore, to speak of a single bacterium as the causal agent of such a disease.

We are of the opinion, however, that this situation does not constitute the entire picture. The conception of an infectious disease as having a single etiology is in general too narrow, and there are many infections which result from the cooperative activities of two or more types of micro-organisms. It may be asked, first, whether the micro-organisms present in a mixed culture are passive with respect to one another or whether one species is affected, either adversely or favorably, by proximity to other actively metabolizing forms; and second, whether or not a given phenomenon for which no single species can be shown to be responsible may result from the combined activities of a heterogeneous group of bacteria.

It would be well at this point to qualify or define the term "synergism" which is used in this paper to describe this relation of micro-organisms. This is necessary because throughout the literature the terms "symbiosis," "metabiosis," "synergism," and "antibiosis" are used to describe similar situations. The inevitable result is to confuse the reader as to what the investigator actually means. When different varieties of organisms occur together in the same medium or locus, one may prevent the growth or annul the effect of the other, a relationship known as antibiosis. In contrast to this situation, two or more groups of bacteria may function together in a relation of synergism, producing a result which the single species alone could not have accomplished.

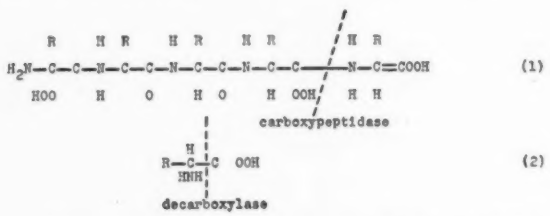
In 1923 Kammerer[1] introduced the term "synergism" as a designation of the associated activities of two or more species of bacteria upon a single substrate. Smith and Martin[2] agree that bacterial synergism results in important chemical changes in substrates and also maintain that its importance in mixed infections is probably equally as great.

Other workers believe that the term "synergism" should be limited to a situation in which two or more harmless organisms acquire the ability to produce disease by a cooperative effort. In 1948 Meleney[3] reviewed infections of this type in some detail. The result produced by a mixed culture of a microaerophilic nonhemolytic streptococcus and an aerobic Micrococcus pyogenes var. aureus was an extensive area of gangrene, although the organisms when injected separately were unable to initiate an infection. We agree that two or more harmless organisms may acquire this capacity through a synergetic relationship; but the meaning of the word should be broadened to include the fact, as we shall point out later, that two micro-organisms co-operatively may produce a syndrome slightly different and more severe than either could produce independently.

Perhaps the best known example of disease produced through the combined activities of two micro-organisms is Vincent's angina, an inflammatory condition of the gums and palate incited by fusiform bacteria and the spirochete, Borrelia vincenti. Webster and Clow[4] believe that it is probable that the simultaneous increase in streptococci, pneumococci, and influenza bacilli (generally considered normal flora within certain limits of numbers) in the nasopharynx during more or less severe infection of the upper respiratory tract is another case of synergism. Smith and his coworkers[5] found that a common type of spontaneous pulmonary abscess in rats was caused by synergism of a microaerophilic micrococcus and an aerobic coliform organism. In the Duke clinic two instances of pulmonary abscess in man have been found in which this same type of synergism was present.

Another consequence of bacterial association which has been of considerable interest in regard to mixed infections is the alteration of the virulence of a pathogenic bacterium by association with other micro-organisms. The virulence of a bacterium may often be increased by inoculation of a pathogenic organism in mixed culture. Thus, Jordan and Burrows[6] report that the mixture of Bacterium prodigiosum, a nonpathogenic form, with the bacillus of malignant edema increases the virulence of the latter so that sublethal doses for experimental animals become lethal. Similarly the virulence of hemophilic bacteria is readily raised by inoculation of the experimental animal with mixed cultures. Phenomena such as these indicate that the etiology of many diseases must be a highly complex matter.

We have mentioned that two micro-organisms through synergetic action may bring about a syndrome slightly different from that either could accomplish alone. This syndrome appears to be directly related, in many instances, to a two-phase protein hydrolysis reaction, each phase of which is initiated and controlled by a specific group of organisms. In the first stage of hydrolysis peptides are split at their terminal linkage by an exopeptidase system, carboxypeptidase, with the liberation of free amino acids. The hydrogen ion concentration of the reaction area is therefore acid, and the hydrogen ion concentration of the intestinal contents is lowered considerably. During the second phase of the reaction carbon dioxide is split from the amino acid constituent by a decarboxylase enzyme. (Specific amino acids possess decarboxylases correspondingly named; for instance, histidine decarboxylase splits carbon dioxide only from histidine.) The hydrogen ion concentration of the reaction area now has assumed an alkaline value so that there is a subsequent shift of the intestinal hydrogen ion concentration to an abnormal alkaline reaction. This phase of the scheme is brought about by Brucellae and other micro-organisms, and the entire scheme may be represented by the equations:



(1)

(2)

There are three principal pathologic conditions resulting from this phenomenon. Two occur in the intestinal tract and are direct manifestations of the reaction products. The third effect is brought about within the host's body tissues following adsorption and assimilation of these amines. The first effect is on the acid-producing flora of the intestine, principal among which are the lactobacilli, and upon other so-called normal flora organisms. These bacilli act chiefly to buffer the intestinal contents, thereby controlling the mobility and irritability of the intestinal wall. Alternate diarrhea and constipation result from the disturbed hydrogen ion concentration and intestinal irritability. The third effect is the stimulation of tissue response to these allergenic substances with associated or dissociated blood picture changes.

A fourth condition—though somewhat secondary to the above changes—is a marked increase in fecal excretion of calcium followed by a fall of the blood serum calcium level. Since calcium is poorly absorbed from an alkaline medium, more and more of the element is excreted with progressive alkaline change in the intestine. Indeed, the serum concentration of this element is an excellent indication of the extent of the infection.

The above generalizations have been presented to acquaint the reader with the nature of specific examples of the same type which have been encountered in investigations of synergetic relationships between certain gram-negative bacilli and the Brucellae. These examples, and others of similar nature, are considered in the following section of the paper.

EXPERIMENTAL FINDINGS*

The gram-negative bipolar bacillus with which this investigation is concerned does not conform to the characteristics of any bacterium described in "Bergey's Manual of Determinative Bacteriology."[7] It is closely similar to several as yet unidentified micro-organisms which have been observed and described during recent years.

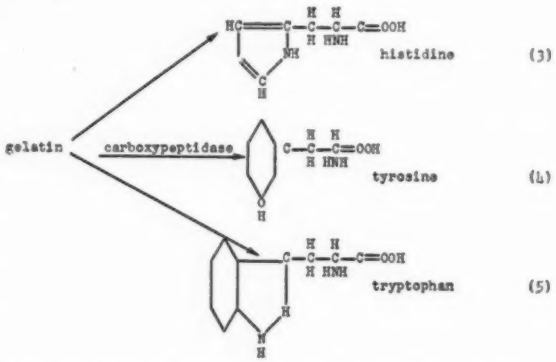
Morphology.—

The organism is a gram-negative bacillus characterized by marked bipolar staining. In young cultures definite rods are rare, coccoid and coccobacillary forms being more numerous. Stock cultures progressively metamorphose into the true bacillary form. The cells assume no definite arrangement but exhibit a tendency toward palisade arrangement. The organism is encapsulated in freshly isolated cultures, losing this characteristic completely after repeated subculture. It is nonsporulating and nonacid fast.

Physiological and Biochemical Characteristics.—

Biochemically the organism is characterized by extreme proteolytic capacity. It attacks gelatin and other proteins, producing end products possessing an acid reaction. It possesses a wide fermentative spectrum, acid and gas being produced from the usual carbohydrates employed in laboratory identification. These and morphologic characteristics are summarized in Table I.

The proteolytic activity of the organism is its most interesting and probably most important characteristic. Its hydrolysis of protein material in the intestine is brought about by the action of carboxypeptidase resulting in the production of free amino acids. This reaction is the first in a well-understood series and is represented by the equations:



(3)

(4)

(5)

This reaction obviously lowers the reaction of the intestinal contents to the acid side, sometimes to a hydrogen ion concentration of 4 to 4.5.

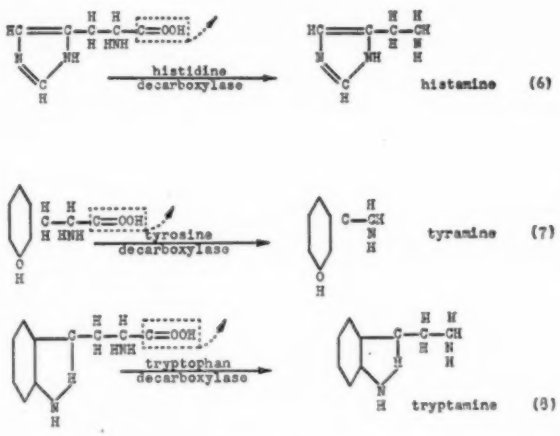
The second phase of the reaction series completes the synergistic relationship between this organism and the Brucellae. The amino acid constituents are decarboxylated by specific decarboxylase systems possessed by the Brucellae and related forms of bacteria. The scheme ultimately results in the production of the corresponding amines, followed by a return of the intestinal reaction to an abnormal alkaline value, sometimes to a hydrogen ion concentration of 10, but more commonly to 8.5

*Courtesy the R. G. Taylor Laboratories.

TABLE I

Cellular	Colonial	Dextrose	Lactose	Maltose	Saccharose	Dulcitol	Mannitol	Inositol	Raffinose	Rhamnose	Gelatin
Coccoid bacilli, 0.7μ×1.5μ, In pallisades, Capsules (—), Spores (—), Gram (—), Acid-fast (—).	Punctiform, Circular, Entire, Luminescent, Butyrous, Yellowish, Gray-white.	AG	AG	GNC	AG	AG	AG	GNC	GNC	AG	+

to 9. The decarboxylation of the individual amino acids is represented by the equations:



Clinical Manifestations.—

During the first phase of the reaction, the phase of increased acidity, the mobility of the intestinal mucosa is disturbed, initiating watery diarrhea. During the second phase of the reaction, when the reaction has become abnormally alkaline, progressive constipation becomes patent. The explanation is twofold: Specifically, the intestinal irritability and the alkaline reaction area which is produced prevents the acid-producing flora, principally the lactobacilli, from growing and multiplying.

On adsorption and assimilation of these toxic amines, the blood picture of the patient changes appreciably. The hydrogen ion concentration of the blood approaches a slight to moderate alkalinity, as evidenced by instrument determination and staining capacity of the lymphocyte. The lymphocytic cell is normally slightly acid in reaction and therefore has an affinity for an alkaline stain such as methylene blue. As the concentration of amines in the blood stream increases and the hydrogen ion concentration becomes more alkaline, the lymphocyte develops an affinity for an acid stain such as fuchsin. In a representative blood film all stages in this atypical staining are observed, from a customary methylene blue-stained cell to an atypical pink fuchsin-stained cell. Intermediate stages exhibit acidophilic stippling in varying degrees.

The altered hydrogen ion concentration of the blood stream and consequently of the entire body tissue has another possible manifestation. Tissue protein is best resynthesized from exogenous building material in an acid medium. The alkaline hydrogen ion concentration of tissue probably inhibits this process considerably and may account, at least in part, for the patient's loss in body weight.

A somewhat indirect effect of adsorption of these toxic substances is a great increase in blood sugar. Amines are known to have an adrenal stimulatory capacity. The increased adrenal hormone production inhibits the production and action of insulin, thereby causing an increase in the blood sugar level.

A postulation is also drawn from the alteration of serum globulin. The globulin is altered both in particle size and spatial electrical configuration, thereby altering the electrophoretic pattern. Thus the antigen-antibody reaction is disturbed.

Furthermore, on adsorption into the blood stream of these substances and transport to various body tissues, the typical allergenic response occurs. This response on the part of the host is characterized by all the usual ramifications, but particularly by a dry papillous erythematous area or a purulent edematous lesion.

It is our belief that further study will lead to formulation of the etiologic pattern and possible treatment of this interesting and serious infection so characteristic of synergetic relationships among micro-organisms indigenous to man.

2105 Independence Ave.

REFERENCES

1. Kämmerer, H.: Formation of hematoporphyrin by intestinal bacteria. Klin. Wchnschr. 2:1153-1155, June 18, 1923.

2. Smith, D. T., *et al.*: Zinsser's Textbook of bacteriology. Ed. 9. Appleton-Century-Crofts Co., New York, 1948.

3. Meleney, F. L.: Treatise on surgical infection. Oxford University Press, New York, 1948.

4. Webster, L. T., and Clow, A. D.: Association of pneumococci, Hemophilus influenzae, and Streptococcus hemolyticus with coryza, pharyngitis, and sinusitis in man. J. Exper. Med. 55:445-453, March, 1932.

5. Smith, D. T., Bethune, N., and Wilson, J. L.: Etiology of spontaneous pulmonary disease in albino rat. J. Bact. 20:361-370, Nov. 1930.

6. Burrows, W.: Jordan-Burrows Textbook of bacteriology. Ed. 15. W. B. Saunders Co., Philadelphia, 1949.

7. Bergey's Manual of determinative bacteriology, ed. 6, by R. S. Breed, E. G. D. Murray, and A. P. Hitchens. Williams & Wilkins Co., Baltimore, 1948.

Journal A.O.A.
October, 1954

Nitrous Oxide-Oxygen Potentiation*

A Clinical Study

A. A. GOLDEN, D.O.
Wilmington, Del.

PART I

INTRODUCTION

The term "balanced anesthesia" was first introduced by Lundy[1] in 1926. According to him, the term should indicate a combination of anesthetic agents and methods, so balanced that part of the burden of relief of pain is borne by preliminary medication, part by local anesthesia, and part by one or more general anesthetic agents. As time went on and more anesthetic agents became available and more anesthesiologists became available for administering them, a tendency arose to use several agents and methods in a single operation. Gradually, although there is still adherence to Lundy's basic concept, that is, not to overdose the patient with any one drug, "balanced anesthesia" has been redefined.

A better working knowledge of the physiologic and pharmacologic mechanisms of the body has brought about widespread combination of two or more anesthetic agents and technics in a single anesthesia, thereby making it possible to use the agent and technic best suited to the requirements of various stages of the anesthesia.

No anesthetic agent or technic can satisfy all the criteria necessary for perfection. Each has its own inherent advantages and disadvantages. However, it is the purpose of this paper to present a technic for balanced anesthesia, one which is as physiologic as possible in that oxygen in more than sufficient volume is administered, one in which the normal homeostatic mechanism is maintained, and one in which little or no change occurs in the body economy.

This presentation has been divided into two sections: Part I deals with a balanced technic of anesthesia to potentiate nitrous oxide. Part II deals basically with the same theme, but the pharmacology and technic of administration of an additional potentiating agent to further improve nitrous oxide-oxygen anesthesia will be discussed in detail.

Anesthesia has been described as an unphysiologic state. Clement says, "we 'asphyxiate with nitrous oxide, drown with ether, poison with cyclopropane, or paralyze with spinal.'"[2] The original summary of Seevers' and Waters'[3] definition of an ideal anesthetic agent may be amended as follows:

1. The technic should provide for a rapid and pleasant induction with a recovery period which is also rapid and free of discomfort.

2. The surgeon would be satisfied if the technic were nonexplosive, and if it were capable of producing complete relaxation.

3. The anesthesiologist desires a combination of agents which would have a wide margin of safety, cause a minimum of organic or functional trauma during or following use, be eliminated readily from the body, be of sufficient potency that a high percentage of oxygen may be employed, be flexible enough to be used in practically all age ranges and degrees of physical status, and, at the same time, allow for moment-to-moment control of anesthesia.

Such qualifications, it is felt, are satisfied by the method to be described. While there are theoretic factors which may be questioned, there can be little question about the clinical course of the anesthesia and the postanesthesia period.

This first series comprises 152 patients coming to surgery and ranging in age from 10 to 78 years (Table I). The various indications for operation and anesthetic data are presented in Table II. Intratracheal intubation was performed on 78 per cent of these patients; 111 intubations were by the oral route, eight by the nasal route. The types of surgical procedures are tabulated in Table III, and preoperative complications are listed in Table IV.

Prior to anesthesia each patient received premedication; the dose was individually determined according to the patient's age, weight, and physical status without regard to the proposed length of the procedure. Meperidine hydrochloride (Demerol) and morphine sulfate were the opiates used, while atropine sulfate and scopolamine hydrobromide were the parasympatholytic agents used. An attempt was made to administer the preanesthetic medication 45 to 60 minutes prior to the induction of anesthesia. It must be truthfully stated, however, that this ideal was not always attained.

AGENTS USED

Nitrous oxide is the primary agent utilized in this method of balanced anesthesia. Nitrous oxide is a truly remarkable gas. While it has anesthetic properties, in the presence of adequate oxygenation it is innocuous to the tissues and to the vital functions of the body such as respiration and circulation. Nitrous oxide is carried in solution in the blood, and in that medium is fifteen times more soluable than nitrogen and 100 times more soluble than oxygen.[4] It does not combine with or affect hemoglobin. Its rate of absorption and elimination is extremely rapid. Five minutes after anesthesia has been terminated it is no longer detectable in the blood. It is the only inhalation agent that has no depressant or toxic action on any of the organs of the body in the presence of sufficient oxygen. Nitrous oxide does not depress the protective mechanisms of the body.[5] There are no absolute contraindications to its use, other than an inexperienced anesthetist or inefficient apparatus.[6]

According to Guedel[7] nitrous oxide is classified as a 15 per cent potency agent. In other words, by its anesthetic action alone it is capable, with proper premedication, of carrying anesthesia only to

TABLE I—AGE RANGE

Ages	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80
Number of Cases	1	4	30	34	36	24	17	6

*Presented in part at the annual meeting of the Pennsylvania Osteopathic Society of Anesthesiologists, Harrisburg, Pa., September 27, 1953.

TABLE II

Operative Procedure	Number	Age	Weight (lbs.)	Thiopental (mg.)	Meperidine (mg.)	Succinylcholine (mg.)	Anesthesia Time (minutes)
Head and neck	26	37	145	495	85	185	85
Gastrectomy and gastrotomy	10	56	127	555	115	565	166
Cholecystectomy and biliary system	33	45	146	628	86	510	98
Appendectomy	6	33	110	367	80	188	51
Total hysterectomy	27	40	129	512	98	452	119
Other pelvic procedures	16	24	98	369	60	215	71
Cesarean section	3	23	182	465	75	197	47
Prostatectomy	3	63	174	540	35	90	45
Intestinal resection	8	62	154	475	80	437	117
Hernioplasty	7	56	153	610	60	285	83
Nephrectomy	2	56	125	435	110	200	100
Miscellaneous	11	58	135	510	65	323	98

Ages, weight, amount of drugs, and anesthesia time are averages for all cases undergoing each type of operative procedure.

slightly below the middle of the first plane or 15 per cent of the way through the third stage of anesthesia.

In order to be used as a safe agent for general anesthesia, and especially for surgical procedures where muscular relaxation is essential, nitrous oxide must be potentiated. This potentiation is now obtainable by combining an ultrashort-acting barbiturate, such as thiopental sodium (Pentothal) or hexobarbital sodium (Evipal),† utilized for hypnosis only; meperidine hydrochloride (Demerol), used for analgesia; and succinylcholine chloride,‡ utilized for the production of muscular relaxation. Another agent, chlorpromazine (SKF 2601-A, used experimentally as Thorazine§), was not used in the first series but will be discussed in detail in Part II.

TABLE III—TYPE OF SURGICAL PROCEDURE

Head and Neck:		26
Thyroidectomy	12	
Tonsillectomy	5	
Teeth extraction	3	
Rhinoplasty	2	
Mastoidectomy	2	
Parotid gland excision	2	
Upper Abdominal:		43
Cholecystectomy, cholangiography, choledochotomy	33	
Gastrectomy	9	
Gastrotomy	1	
Lower Abdominal:		60
Hysterectomy (total)	27	
Other pelvic procedures	16	
Cesarean section	3	
Appendectomy (sole procedure)	6	
Intestinal resection	7	
Exploratory laparotomy	1	
Extraperitoneal:		13
Cystostomy, prostatectomy	3	
Hernioplasty (inguinal)	4	
Hernioplasty (ventral)	3	
Nephrectomy, nephropexy	2	
Closure of dehiscence	1	
Miscellaneous:		10
Vaginal plastic	3	
Lumbar sympathectomy	2	
Radical mastectomy	1	
Diaphragmatic hernioplasty (transthoracic)	1	
Laminectomy	1	
Leg amputation	1	
Excision of urachal cyst	1	

Anesthetic literature of recent years has documented various methods of potentiating nitrous oxide.[8-15] These methods were studied in various types of surgical procedures, but at no time was complete satisfaction obtained. The main source of dissatisfaction was the respiratory depressant effects of the various muscle relaxants then commonly in use, no matter how careful was their administration and regardless of the use of pharmacologic antagonists. Since the introduction of succinylcholine chloride, the anesthesiologist has had a curariform agent over which he had moment-to-moment control.[16]

Thiopental sodium was the ultrashort-acting barbiturate used in the present series. Thiopental sodium has been used since 1934, following its introduction

†Hexobarbital sodium used in the second series of cases was supplied through the courtesy of J. R. Lucas, Department of Medical Research, Winthrop-Stearns Inc., New York, as Evipal.

‡Succinylcholine chloride was supplied through the courtesy of Donald S. Searle, M.D., Medical Director, Burroughs Wellcome & Co., Tuckahoe, N.Y., as Anectine, and J. R. Lucas, Department of Medical Research, Winthrop-Stearns Inc., New York, as WIN 7907-A, Unatril chloride.

§Chlorpromazine was supplied through the courtesy of the Research Division, Smith, Kline & French Laboratories, Philadelphia, as Thorazine, SKF 2601-A.

TABLE IV—PREOPERATIVE COMPLICATIONS

Hypertension	35
Coronary heart disease	3
Arrhythmias	3
Asthma	1
Diabetes mellitus	2

into clinical anesthesia by Lundy.[17] This agent is well known in the light of present-day knowledge to have certain inherent limitations, the main one being that it is a potent hypnotic and not an anesthetic agent.[18] Because of this, thiopental sodium is utilized in fractionated doses only to produce sleep during the course of anesthesia.

Meperidine hydrochloride was introduced by Eisleb and Schaumann of Austria in 1939.[5] It is an excellent analgesic and antispasmodic, having also a slight sedative action. A voluminous literature is available regarding its uses.[10,20,21] Utilized intravenously it is slightly hypnotic and only mildly depressant to the circulatory and respiratory systems. It also is given in fractionated doses according to individual need.

With the combination of the aforementioned agents a flexible method of anesthesia is obtained which is utilized for surgery of long duration and for securing adequate muscular relaxation. Barbour[21] reported that the brains of animals anesthetized with barbiturates or opiates exhibited a measurable shift in the water balance between the cerebrum and the medulla. The cerebral cortex loses water which is taken up by the medulla. As the effect of the drug diminishes and a return to normal cerebration supervenes, the medulla gives up the water and the cerebral cortex rehydrates. One can reasonably assume that repeating the doses of narcotic agents with the continued inhalation of nitrous oxide would maintain this fluid shift. Barbour did not observe such a water shift taking place with diethyl ether, vinyl ether, or cyclopropane.

While this explanation tends toward the theoretic, it is presented in an effort to explain the consistently predictable action of this balanced anesthesia.

TECHNIC

Infusion of 5 per cent dextrose in water is started preanesthetically, usually in a vein on the dorsum of the hand or the wrist. Anesthesia is induced through this previously started infusion by injection of a 2.5 per cent thiopental sodium solution into the intravenous tubing, the dosage depending on the age, weight, and physical status of the patient. Then succinylcholine chloride, 0.2 per cent solution, is dripped into the rubber sleeve containing the dextrose infusion. The face mask is then applied to the sleeping patient, and nitrous oxide-oxygen in a 50:50 ratio with a total flow of 8 liters per minute is begun through a semiclosed circle filter system. Apnea occurs within 30 to 40 seconds, and if intratracheal intubation has been decided upon, the tube can then be inserted with great facility.[16] Ventilation is readily controlled by the anesthesiologist until spontaneous respirations resume, usually within 5 minutes. The rate of flow of the succinylcholine drip, meanwhile, has been slowed. Controlled respiration may be continued by the anesthesiologist if desirable for technical reasons.

If intratracheal intubation is not performed or not desirable, as in cesarean section, or when appendectomy is to be performed as the sole procedure, then the succinylcholine drip rate is so regulated that the rebreathing bag barely moves with respiration. As with all inhalation anesthetics administered by a machine, it is assumed that the anesthesiologist will have his hand on the rebreathing bag and assist each respiration. Watrous, Davis, and Anderson[22] say, ". . . assisted (or compensated) and controlled respiration are logical technics that should be used with certain exceptions in general anesthesia administered by a closed or semiclosed system . . . because all anesthetic agents, except nitrous oxide and ethylene, and the premedication sedatives depress the sensitivity of the respiratory center to carbon dioxide. This results in a respiratory acidosis with accumulation of carbon dioxide, which varies with the depth of anesthesia and with the agent. . . ."

If indications for intratracheal intubation arise in the course of anesthesia, the tube can be introduced immediately. There have been occasions in the course of a long procedure, such as radical mastectomy, in which intubation of the trachea was performed to insure a continuously patent, unobstructed airway.

Meperidine hydrochloride is then given intravenously in dosages varying from 25 to 50 mg. The effect of this drug can be noted in about 5 minutes. Meperidine, being both spasmolytic to the smooth muscle of the bronchial tree and analgesic by its central action, tends to smooth the anesthesia and lessens the possibility of cough or other tracheal irritation.[23] While meperidine is reported not to depress respiration,[24] I have seen respiratory depression occur frequently enough to cause me to administer this drug cautiously. On several occasions the respiratory rate has fallen from 18 to 20 per minute to 12 per minute following intravenous injection of meperidine. Under anesthesia and with manual bag pressure adequate ventilation is obtained. No untoward results need be feared. No vasomotor depression which might in any way be attributable to the drug has been noted. Occasionally in some patients a red line can be observed extending along the course of the vein into which the meperidine was injected. This redness, which resembles an urticarial wheal, tends to disappear in from 15 to 30 minutes. The cause is probably a local histamine-release action. The effective dose of meperidine can be repeated in 20 to 30 minutes if necessary.

After obtaining sufficient experience with this technic, the following observations seem important to record:

1. The requirement for thiopental sodium is greatest in the first 30 to 45 minutes of anesthesia. As further experience with the method was gained, the initial dose, as a rule, became the total dose of thiopental, regardless of the length of the surgical procedure.

2. If further analgesia was required in the course of anesthesia, as noted by slight wrinkling of the patient's forehead, some swallowing motions, or movements of the fingers of the outstretched hand, it was obtained by intravenous injection of 25 mg. of meperidine.

3. Very often there was deliberate resort to controlled respiration, since early in the series it was observed that utilization of an apnea technic resulted in lowering the requirements for thiopental, meperidine, and succinylcholine. Dundee[25] and Gray and Rees[26] have made similar observations. In other words, with controlled respiration, perhaps because respiration is effortless on his part, the patient requires much less anesthetic agent than the patient who is allowed to breathe spontaneously. When controlled respiration is properly carried out undesirable side effects which have been reported[27-30] are not experienced.

POSTANESTHETIC COMPLICATIONS

The complications have been minimal in this series. There were no deaths due to the anesthesia. I had administered the anesthetic to all but seven of

the patients. Especially favorable were the comments of those on the staff who had previously felt that spinal anesthesia had the fewest complications.

The percentage of pulmonary complications was almost negligible. Several factors seemed to operate in this regard. All patients were requested to cease smoking 24 to 48 hours prior to surgery and, when possible, for even longer. Coughing was encouraged during the preanesthetic period. One of the first acts requested of the patient at the termination of surgery was to cough and take several deep breaths. This usually took place in the operating room. Two cases of atelectasis occurred, both segmental in nature, and both should have been prevented by the administrator. This seems evidence enough that pulmonary function was certainly not impaired by this technic.

A thorough tracheobronchial toilet is performed prior to and upon extubation of the trachea, while oxygen is administered concomitantly in order to minimize any transient lowering of alveolar oxygen. It is my belief from extensive personal experience that meticulous attention to these details will help in minimizing the incidence of pulmonary complications.

Hoarseness was a minor, but at the same time the most frequent, complaint. This was presumed, in all instances, to have been due to the presence of the endotracheal tube. There were sixteen patients who had this complaint, which ranged from a feeling of fullness in the throat to laryngitis. No special therapy was necessary, and only three patients had hoarseness persisting up to the fourth postanesthetic day.

Nausea and vomiting occurred in eighteen patients, in seven of whom the duration was from 48 to 72 hours postanesthetically. There did not appear to be any relationship between this complication and the surgical procedure.

DISCUSSION

The technic just presented is one in which individualization of each case is essential. While age, weight, and physical status of the patient are factors utilized as guides for induction and maintenance of anesthesia, sufficient variables occur in patients to interdict a fixed dosage schedule on a milligram-per-kilogram-of-body-weight basis.

In order to emphasize the individualization of each case, several protocols are here presented in which the surgical proceduces are similar, duration of anesthesia approximately the same, but the drug requirements entirely unrelated.

Case 1. An obese 72-year-old female, physical status 2‖ (mild hypertension), came to surgery for cholecystectomy. Duration of anesthesia was 105 minutes. She weighed 174 pounds and required a total dose of 1 gram of thiopental sodium, 200 mg. of meperidine hydrochloride, and 475 mg. of succinylcholine chloride. She was extubated on the operating room table, awake, and rational.

Case 2. A thin 32-year-old female, physical status 1, came to surgery for cholecystectomy. Duration of anesthesia was 110 minutes. She weighed 93 pounds and required a total dose of 425 mg. of thiopental sodium, 75 mg. of meperidine hydrochloride, and 600 mg. of succinylcholine chloride. At the conclusion of surgery this patient was awake on the operating room table.

Case 3. An obese 60-year-old male, physical status 3 (hypertensive heart disease), came to surgery and underwent choledochotomy, cholecystectomy, and appendectomy. Duration of anesthesia was 110 minutes. He weighed 190 pounds and required a total dose of 500 mg. thiopental sodium, 100 mg. meperidine hydrochloride, and 600 mg. of succinylcholine chloride. He also was awake on the operating room table at the conclusion of surgery.

Succinylcholine chloride requirements were high in some of the patients in comparison with those of others undergoing similar procedures and having approximately the same total anesthesia time. This again serves to emphasize individualization of the dosage, as succinylcholine chloride was utilized only as needed for the required muscular relaxation and as an aid to controlled respiration.

The level of surgical anesthesia at no time was lower than plane 1, stage III. However, it is felt that this statement is open to question, since with this technic the classification of Guedel[7] cannot rightfully be applied. A new set of signs and planes of anesthesia will have to be formulated. Some steps already have been taken in this direction.[31-33] My own personal impression is that with the triad of hypnosis, analgesia, and muscular relaxation such as has been presented, the patient goes rapidly from a state of consciousness to one of unconsciousness, with the retention of the various protective reflex mechanisms of homeostasis. It is thought that a classification comprising two stages of surgical anesthesia, light and deep, should suffice with a technic such as this. Data are being accumulated to bear out this contention.

Regardless of the duration of anesthesia, well over 98 per cent of the patients were awake on the operating room table at the conclusion of surgery. They were able to respond when told to cough, take a deep breath, or open their eyes. Peripheral muscle tonus seems to be unimpaired, even with adequate abdominal muscular relaxation and despite the use of succinylcholine chloride. This is felt to be one of the many factors in the prevention of shock and, therefore, an advantage of this type of anesthesia. The light plane of anesthesia in which the patients are carried permits activity of reflexes which are of benefit to the patient and which aid in maintaining his body equilibrium.[34,35] The defense mechanisms of the body can easily adapt themselves to stress factors because the integrity of the cardiovascular system is intact. Deep planes of anesthesia depress such defense mechanisms.[36]

Rarely do the patients complain of severe pain immediately postoperatively. This of course tends to reduce the need of narcotics for pain relief. Amnesia is common, and nausea and vomiting postoperatively are relatively infrequent.

A high flow of gases is utilized in this technic, the total flow being not less than 8 liters per minute. Often during the anesthetic course the ratio of nitrous oxide-oxygen may be altered to suit varying conditions, changing from a 6:3 liter per minute flow to a 4:4 proportion. The use of this high flow has several purposes: carbon dioxide retention is prevented both by the blowing off of excess carbon dioxide through the semiclosed system and by the soda lime present in the circle filter absorber; body nitrogen is eliminated, this denitrogenation enhancing the nitrous oxide; and better oxygenation of the patient ensues.

It is the general opinion today that the hypercapnea which is often present in a closed system of

‖Physical status was graded as follows: (1) excellent, (2) good (minor systemic disease only), (3) fair (moderately severe systemic disease), (4) poor (severe systemic disease), (5) good (emergency; normally 1 or 2), (6) poor (emergency), (7) moribund.

anesthesia may be responsible for deleterious cardiac reflexes and other circulatory disturbances.[37-41]

Some anesthesiologists advocate the closed method of administering nitrous oxide and submit data to substantiate their stand.[42] A difference of opinion must be expressed. In a closed system of nitrous oxide-oxygen administration the inherent disadvantages of the method will tend to outweigh the advantages. Heat retention, rebreathing of water vapor,[43] and diminution of the efficiency of soda lime occur in a long procedure. No matter how high an oxygen concentration is maintained for the physiologic needs of body metabolism, the inherent disadvantages enumerated above still occur. For that reason it is felt that a high flow of gases through a semiclosed system is more physiologic. James[44] has been inclined to alter his technic to utilize a high flow in a 6:2 proportion of nitrous oxide-oxygen.

A few words should be said regarding the high percentage of tracheal intubations. With the technic of intubation as now practiced,[16] no deleterious effects have been observed in 2 years. This has been repeatedly checked by electrocardiographic tracings. Since a potential depressant technic is used, for the patient's safety and for the peace of mind of the anesthesiologist a clear, unobstructed airway should be insured at all times. Personal experience has convinced me that the advantages of using an intratracheal tube far outweigh the possible disadvantages. Certainly no alteration in morbidity or mortality has been experienced from its use.[16,45]

Some may disagree with the technic which I have presented because of the necessity for the anesthesiologist to observe his patient constantly, to concentrate on almost a minute-to-minute basis. This should prove more advantageous than disadvantageous. It should be remembered that eternal vigilance is the price of safety. In a recent editorial Murray[46] stated that he demands that his anesthesiologist report the status of the patient every half-minute.

SUMMARY

A few years ago Waters[47] made the following statement, "Improvements in the administration of nitrous oxide will doubtless continue to be made in the years to come. . . . Further improvements in the technic of administration and a wiser choice of adjuvant drugs can, I believe, bring nitrous oxide to a position of usefulness which it has not yet enjoyed."

In support of the above prophecy, an improved technic has been presented for the administration of nitrous oxide in a nonhypoxic concentration for various types of surgical procedures. This method has proved to be very flexible. It is of special value in small hospitals which have no postanesthesia recovery rooms, and where the nursing and professional staffs are at a minimum. No depression of respiratory and circulatory mechanisms has occurred to date.

The technic is simple but rather exacting. It is not a technic for the tyro. It requires experience and the concomitant ability and knowledge to assess accurately the patient's response to drugs. This technic can be readily utilized by the individual who is well grounded in the fundamentals of anesthetic physiology and pharmacology.

From the aspect of mental concentration and constant attention to the patient this method may not become popular with those who are "single agent anesthesiologists"; but for the anesthesiologist who is interested in the science and art of anesthesiology the method will prove fascinating.

PART II

INTRODUCTION

It has long been my contention that no anesthetic agent possesses the fine qualities of nitrous oxide. By itself, however, nitrous oxide is not sufficiently potent to produce satisfactory anesthesia without hypoxia. As described in Part I, however, nitrous oxide becomes an ideal agent when combined with an ultrashort-acting barbiturate, an analgesic such as Demerol, and a muscle relaxant. While the technic and method described in Part I have proved excellent and adaptable to most types of surgical procedures, it has been felt that even higher percentages of oxygen, if possible, would be of greater benefit, especially in the poor risk case.

In 1952 I was introduced to the pharmacologic concepts of Laborit, the French anesthesiologist.[48] I was immediately interested, for he presented an anesthetic method in accord with my own concepts, embodying the use of nitrous oxide with a high percentage of oxygen—even greater than 50 per cent. Briefly, Laborit expounded the belief that if pharmacologic agents are utilized to combat the stress reaction of the body to surgery and anesthesia and to lower body metabolism, less anesthetic would be required, and there would be less demand of the body for oxygen. Various combinations of drugs were utilized in an effort to reduce the overaction of the sympathetic and parasympathetic nervous systems. The vagal blocking action of atropine, the muscle relaxant effect of d-tubocurarine or other curariform agents, the use of an antihistamine (Phenergan), and the hynotic effects of an ultrashort-acting barbiturate were combined to lower body metabolism, block the sympathetic and parasympathetic nervous systems, and produce sleep with relaxation. The anesthetic gas utilized was nitrous oxide-oxygen in a ration of 30:70 and 40:60, the reverse of the proportion in standard technics.

His methods were used clinically but found wanting because it was troublesome to time the injections of the various necessary agents. In addition various "cocktails" and potentiating solutions had been used.[49,50] It was decided to modify Laborit's original technic and use his combination as a single deep intramuscular injection 45 minutes prior to the onset of surgery. This was done, and the end results of both the anesthetic and postanesthetic course were most gratifying to the surgeons and the anesthesiologist.

It is the purpose of Part II of this paper to elaborate on the potentiation of nitrous oxide-oxygen with a new drug related chemically to the antihistamine family of which Phenergan is the precursor. Experience was gained in this series from 120 consecutive surgical patients of varying physical status whose ages ranged from 8 to 73 years. Intratracheal intubation was performed on 90 patients; 74 intubations were by the oral route and 16 by the nasal route. The tables give the pertinent data regarding the patients.

Thorazine,‡ a recently introduced drug in this country, so potentiates the action of the premedication and barbiturate induction that oxygen in a percentage of 60 to 70 can be given with nitrous oxide. Thorazine or chlorpromazine is a phenothiazine derivative and is known chemically as 10-(γ-dimethylaminopropyl)-

TABLE V—AGE RANGE

Ages	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80
Number of Cases	5	15	25	25	21	17	9	3

TABLE VI

Operative Procedure	Number	Age	Weight (lbs.)	Evipal (mg.)	Demerol (mg.)	Unatril (mg.)	Anesthesia Time (minutes)
Head and neck	33	31	135	360	45	195	47
Gastrectomy	2	45	134	475	60	600	150
Cholecystectomy and biliary system	18	59	168	400	45	500	100
Appendectomy	20	25	130	450	40	300	65
Total hysterectomy	16	42	139	430	50	460	142
Other pelvic procedures	14	29	139	430	45	280	85
Cesarean section	4	31	171	360	40	130	50
Intestinal Resection	1	65	120	350	50	600	155
Hernioplasty	10	49	155	400	40	260	86
Miscellaneous	2	43	178	450	50	100	122

Age, weight, amount of drugs and anesthesia time are averages for all cases undergoing each type of operative procedure.

2-chlorophenothiazine hydrochloride. The structural formulas of Phenergan and Thorazine are quite similar, Phenergan being known chemically as 10-(2-dimethylamino-1-propyl) phenothiazine. Thorazine, known in France and Canada as Largactil, is a drug which on clinical study has a polyvalent action, although several of these actions seem at the present to be incompletely defined. Laboratory experiments indicate that this drug has antiemetic, anticonvulsant, antihistaminic, antispasmodic, adrenolytic, and hypothermic activity.[51] It causes depression of the central nervous system, particularly of the vomiting and heat-regulating centers. The incidence of postoperative vomiting is so little as to be phenomenal. Thorazine also exhibits a blocking effect on the sympathetic and parasympathetic nervous systems which is exemplified by these clinical observations: (a) There is increased warmth of the lower extremities, (2) there is usually a fall in blood pressure of from 10 to 20 mm. of mercury, associated with a full and slightly increased pulse rate, and (3) the electrocardiogram shows a negligible incidence of arrhythmias on intubation of the trachea, even when the vocal cords are deliberately touched by the tip of the intratracheal tube.

The drug is apparently metabolized in the body. Icterus has been reported,[51] but in patients taking the drug in tablet form for some time and not with the small dosage utilized in this anesthetic technic.

TABLE VII—TYPE OF SURGICAL PROCEDURE

Head and Neck:		33
Thyroidectomy	4	
Tonsillectomy	18	
Teeth extraction	6	
Rhinoplasty	5	
Upper Abdominal:		20
Cholecystectomy, choledochotomy	18	
Gastrectomy	2	
Lower Abdominal:		55
Total hysterectomy (abdominal)	16	
Other pelvic procedures	14	
Cesarean section	4	
Appendectomy (sole procedure)	20	
Intestinal resection	1	
Extraperitoneal:		10
Hernioplasty (inguinal)	10	
Miscellaneous:		2
Vaginal plastic	1	
Simple mastectomy	1	

AGENTS USED AND TECHNIC

About 45 minutes prior to the anticipated start of surgery, the patient is given an individualized dose of Demerol, scopolamine, and 50 mg. of Thorazine deep into the gluteal region (Thorazine was omitted in the 4 cases of cesarean section). Children, depending on weight, are given from 15 to 25 mg. of Thorazine. An intravenous infusion of 5 per cent dextrose in water is then begun in an accessible vein, preferably on the dorsum of the hand or wrist. By the time the patient is transferred to the operating room table, he is, as a rule, completely indifferent to his surroundings. He is asleep, yet can be readily aroused. Respirations are deep and full. He is not depressed. Blood pressure taken after the patient is settled on the table invariably is lower than it was before premedication was administered, averaging 20 mm. less.

Induction of anesthesia is described in Part I, except that only a minimal amount of Evipal† is required. In this present series in which Evipal was the ultrashort-acting barbiturate used, the induction dose varied from 200 to 500 mg., depending on the patient's weight and physical status and estimated length of the operative procedure. The initial dose of Evipal was the only administration of the drug during the procedure. After a 0.2 per cent drip of Unatril‡ (succinylcholine chloride) was begun, intratracheal intubation could be readily performed. Maintenance is carried out by nitrous oxide-oxygen in a 30:70 or 40:60 ratio with a high flow of 7 to 8 liters per minute. Demerol, 25 to 50 mg., is injected into the intravenous tubing following intubation of the trachea, and the anesthesiologist then conducts the anesthesia in the usual manner.

TABLE VIII—PREOPERATIVE COMPLICATIONS

Hypertensive heart disease	15
Diabetes mellitus	1
Coronary heart disease	1
Arrhythmias	1

POSTANESTHETIC COMPLICATIONS

Postoperatively these patients do remarkably well. There were no surgical or anesthetic deaths. Complications have been absent. These patients are less restless and require less postoperative sedation than those who have been anesthetized by any other method. This clinical observation was especially apparent to the nursing staff and to the surgeons who were exposed to this technic for the first time.

Nausea and vomiting were extremely uncommon. Only three patients experienced vomiting, only one in the first 12 to 18 postanesthetic hours.

The facies of the patients varied from pale to normal, with one universal finding: They were dry and warm, and resembled the facies of patients seen under induced hypotensive anesthesia. There was complete absence of sweating.

A great difference readily noticed in the patients of the second series was their complete indifference to their surroundings. They could be aroused and would obey commands to open their eyes or cough and would then fall asleep again. Respirations were always deep and regular, and at no time was it felt that any of the patients were depressed. These patients seemed to have a better and shorter postoperative convalescence than patients anesthetized with other technics, including the subarachnoid.

There were no pulmonary complications. Hoarseness was a minor but at the same time the most common complaint. There were six cases of hoarseness with alteration in voice, and one case of actual laryngitis. These of course were ascribed to the intratracheal tube, even though all of the tracheal intubations were performed in a deliberate manner and without trauma.

Cardiovascular complications did not occur; however, in three patients the systolic blood pressure fell to a level of 70 to 80 mm. of mercury with no alteration in pulse rate. They were treated by elevating the foot of the bed and administering 100 per cent oxygen by mask.

DISCUSSION

In comparison with the cases described in Part I in which an apnea technic was developed with controlled respiration in order to minimize anesthetic dosage, controlled respiration was not used in the second series; rather, respiration was always assisted.

To the uninitiated surgeons and nurses it was disconcerting in the course of an abdominal operation to have the patient open his eyes or move his legs while maintaining complete abdominal muscular relaxation. This demonstrates the extreme lightness of the plane of anesthesia. Increasing the percentage of nitrous oxide to 50 or 60 per cent for a few minutes, increasing the drip rate of Unatril, and then reverting to the former nitrous oxide-oxygen percentage obviated further awakening during the operation.

Muscular relaxation for the various abdominal operations was excellent, particularly for upper abdominal procedures. This is important since at Riverside Hospital upper abdominal procedures are preferably performed under an intratracheal inhalation technic.

Clinically it was noted that shock was infrequent in the types of case in which it tends to occur; in fact, the patients seemed to be shock resistant. This leads to the conclusion that autonomic blocking takes place which resembles that produced by the methonium compounds.[52]

In general, more barbiturate and Demerol were administered to the patients in the first series, but the dosage of Unatril (succinylcholine chloride) was slightly higher in most cases in the second series. The following protocols will best illustrate the above statements. Case 1 is from the first series; cases 2 and 3 are from the second group of patients.

Case 1. An obese 60-year-old female, weighing 203 pounds, came to surgery with a physical status of grade 3 because of hypertensive heart disease. Cholecystectomy, choledochotomy, and exploration of the common bile duct were performed. Total anesthesia time was 120 minutes. Premedication consisted of Demerol, 50 mg., and scopolamine, 0.32 mg., 45 minutes prior to induction of anesthesia. The total drug dosage was: Evipal, 650 mg.; Unatril, 800 mg. in a 0.2 per cent solution; and fractionated doses of Demerol for a total of 100 mg. Nitrous oxide-oxygen was used in a high flow in a 70:30 ratio.

Case 2. An obese 62-year-old female weighing 200 pounds came to surgery with a physical status of grade 2. Cholecystectomy, adhesiotomy, and ventral herniorrhaphy were performed. Total anesthesia time was 110 minutes. Premedication consisted of Thorazine, 50 mg., Demerol, 50 mg., and 0.32 mg. of scopolamine, 45 minutes prior to induction of anesthesia for which the total drug dosage was: Evipal, 400 mg.; Demerol, 50 mg.; and Unatril, 250 mg.

The smaller total drug dosage in Case 2 was consistent for all cases in the second series. There may be some question of why another pharmacologic agent should be added to an already satisfactory and proved technic. Logically, if an added agent improves an already satisfactory method, that agent is worthy of use.

Case 3. A 10-year-old male came to surgery with a preoperative diagnosis of perforated appendicitis with peritonitis. His temperature was 103F; pulse, 130. Obviously in this condition the utilization of the standard technic with Vinethene induction followed by ether would further upset an already deranged physiologic state. Premedication consisted of Thorazine, 25 mg., Demerol, 50 mg., and scopolamine 0.32 mg. Anesthesia was induced with 400 mg. of Evipal, followed by nitrous oxide administered in a semiopen system through a no-rebreathing valve mask. Ice was packed around the body of the patient after induction of anesthesia to aid in lowering the body temperature. Anesthesia time was 55 minutes, and the patient was awake on the operating room table at the termination of surgery. Rectal temperature was 99F. His postoperative course was excellent. Total dosage of drugs was: Evipal, 500 mg., Demerol, 25 mg., and Unatril, 200 mg.

SUMMARY

An interesting variation of a flexible, nonhypoxic, and potentiated method of nitrous oxide administration is presented for clinical and laboratory consideration. This method was used in 120 consecutive surgical cases. There was no anesthetic mortality, and morbidity was minimal.

It should be emphasized that the technic presented in these two sections is not polypharmacy on a shotgun basis. Rather, it is the careful application of clinical pharmacology for a specific effect and action and the use of drugs only in the amount essential to produce the desired effect.

(Continued on page 126)

THE JOURNAL OF THE
AMERICAN OSTEOPATHIC ASSOCIATION

Published monthly by the American Osteopathic Association

Publication Office, 100 S. Kenilworth Ave., Oak Park, Ill.
Editorial Office, 212 E. Ohio St., Chicago 11, Ill.
Address all communications to the Chicago Office

EDITORS

RAYMOND P. KEESECKER, D.O.....Editor
KATHERINE BECKER.....Assistant Editor

OFFICERS

R. C. MCCAUGHAN, D.O.....Executive Secretary
CLAYTON N. CLARK, D.O.....Business Manager
ROSE MARY MOSER.....Treasurer

COMMITTEE ON EDITORIAL POLICY

ROBERT B. THOMAS, D.O., CHAIRMAN.....Huntington, W. Va.
ROBERT E. COLE, D.O.....Geneva, N. Y.
W. DON CRASKE, D.O.....Chicago

Subscription . . . . . Ten dollars a year in advance

Vol. 54 October, 1954 No. 2

I—RESEARCH AND EDUCATION IN OSTEOPATHY

There has been no lack of source material for writing osteopathic history, in any of its aspects or in its entirety. Yet, there is almost a complete dearth of authentic historical writing about osteopathy and the osteopathic profession. While historical sketches of value have appeared in THE JOURNAL OF THE AMERICAN OSTEOPATHIC ASSOCIATION and elsewhere, there has been little definitive material published concerning osteopathy and its development. This near-total lack has been remedied in part by a recent thesis, "The Development of Osteopathic Research and Education," now available for consultation in the library of an institution of higher learning. It is the first treatise of any length dealing with an aspect of osteopathic history which meets reasonably well the standard requirements of the modern historian. With minor editorial changes the thesis would be worthy of publication in book form.

"The Development of Osteopathic Research and Education" was submitted to the Northeast Missouri State Teachers College, Kirksville, in partial fulfillment of the requirements for the degree of Master of Arts by W. V. Cole, D.O., and was accepted. Although it is a master's thesis, the scope of the subject and its treatment are broad, and the result is a document of real worth. It possesses not only academic value, but it will prove to be most useful source material to the student of medical history, both without and within the osteopathic profession.

It is fortunate at this time that an objective survey of osteopathic research and education has been made which is consistent with the canons of good scholarship. There is a rapidly growing social need to have in acceptable form the data that are presented in this study, and to make them available to persons entitled to know basic facts about osteopathy or others who wish to pursue related studies.

If a document written as objectively as is this thesis had been available for consultation a decade ago by members of the osteopathic profession then beginning a program of improvement of osteopathic research and education, it would have made their task simpler. Less trial and error would have been involved, and the accomplishments of these leaders would have been greater.

The time is ripe for not only this study, but for similar studies, each bearing the hallmark of an educational institution of unquestioned standing in the academic world. Original sources for such studies are manifold. From the beginnings of the osteopathic profession its leaders have had a lively consciousness of its place in history, even though in its earlier days there was little thought of the necessity for keeping and preserving impeccable records. The formation of a national osteopathic body in 1897 and the publication of a national journal in 1901 nourished this consciousness in that it made possible a record of thought and action, invaluable in the production of such documents as the thesis under discussion.

Twenty-five years ago—at about the halfway point in the profession's life—the Editor of the American Osteopathic Association was made its statistical officer, directly responsible for its archives and for preserving there all "historical and scientific records of value." It was fortunate that the then newly elected Editor (Ray G. Hulburt, D.O.) was acutely aware of the importance of historical material. He moved not only to preserve every contemporary record that came to his hand, but he also searched out all extant material that might relate to the development of osteopathy. And in that endeavor, it was equally fortunate that he had the full cooperation and continuing effort of a newly elected national secretary—for the first time invested with the title, duties, and responsibilities of Executive Secretary (R. C. McCaughan, D.O.). This complementary relationship resulted both in records being made and records being preserved. From that time on, records of the profession's policy and practice have been maintained well-nigh perfectly.

It is not the business of men concerned primarily with organizational responsibility to determine what records may or may not have historical value. It is their duty to conserve all material, recording contemporary policy and practice. Only the trained historian, apt in relational knowledge, is fitted to select what seems to him important to illuminate the aspect of specific history to which his particular project calls him. The gradual development within the editorial department of a "Division of Information and Statistics," under the immediate direction of a trained supervisor (Josephine Seyl), insures continued preservation of all possible source material. Since this carefully directed activity has been concurrent with the profession's most rapid advance as a school of medicine, there is now available a wealth of material for future historians, as

well as basic and fundamental documents dealing with the earlier years of osteopathy.

"The Development of Osteopathic Research and Education" is the first document, written within the limitations of objective and acceptable scholarship, which sets out to explore a fundamental activity of the osteopathic profession. Consequently, the thesis possesses dual value. It makes readily available to those individuals who are now engaged in an accelerated development of the profession's research and educational activities an accurate account of its past activities in those fields, and its assists them in relating the present program of research and education to previous programs. The thesis will thereby serve well the Bureau of Research of the American Osteopathic Association; it will help to orient the unofficial but nationally research-interested Foundation for Research of the New York Academy of Applied Osteopathy; it will bring to each of the osteopathic colleges a better understanding of the close alliance in osteopathy between research and education; and it will insure the Academy of Applied Osteopathy and other affiliated or indirectly connected bodies of organized osteopathy a perspective they may not have otherwise possessed.

This particular thesis will become a document of increasing value to scholars interested in the study of osteopathy as a social movement, and to organized groups seeking to render an objective judgment on osteopathy and the osteopathic profession. It seems likely that these groups will greatly increase in number within the next decade. It is true that the thesis is not, nor does it claim to be, an exhaustive or definitive study of either osteopathic research or education. It is an excellent introduction to those fields. To those evaluating osteopathic research activity, "The Development of Osteopathic Research and Education" can well prove to be an indispensable document, accomplishing much of the spadework necessary for the definitive studies of osteopathy yet to be done.

SPOTLIGHT ON LOS ANGELES

The spotlight that continually pinpoints osteopathic advance has shifted from the Eastern Seaboard where it last rested (the Osteopathic Hospital of New York) to the West Coast, describing an arc that takes in both the breadth of the profession and the people it serves. For this moment a dream stands out, made visible in architects' drawings and contractors' blueprints. And it is possible for hundreds of osteopathic physicians throughout America to have a very practical part in bringing this dream to life, but at no cost to them except ink, paper, and a stamp.

On November 2, 1954, the voting citizens of Los Angeles County will determine if the osteopathic unit of the Los Angeles County General Hospital is to be replaced by a modern teaching structure to supplant the aged and totally inadequate buildings which constitute the present institution. It must be remembered, however, that it is this old structure which has long brought honor to the College of Osteopathic Physicians and Surgeons and the osteopathic profession and has richly served thousands of human beings in Los Angeles County within the best traditions of medicine. The real foundations of the osteopathic unit of Los Angeles County General Hospital will remain — good will engendered by good medical care over a quarter of a century.

That the osteopathic unit of Los Angeles County General Hospital no longer is fitted to the needs of the community it serves may seem a local problem and not one for the consideration of osteopathic physicians in other states. But this conclusion is far from the truth. The osteopathic teaching hospitals directly connected with the osteopathic colleges all bear a special relation to the complete program of osteopathic education. And that takes no account of other hospitals that forward osteopathic education through their excellent intern and residency training programs. All are sources of pride to the profession, but the college-connected institutions occupy a unique position in our profession because of their special significance. Of the osteopathic teaching hospitals, the proposed new osteopathic unit for COPS at this moment stands in the sun for all to see.

Before we point out the role our readers can play in bringing this project to realization, we should reacquaint ourselves with one of the world's outstanding medical institutions, the Los Angeles County General Hospital. Last November this hospital celebrated its seventy-fifth anniversary. This occasion was also one for celebrating the twenty-fifth anniversary of the osteopathic unit. In calling the attention of the osteopathic profession to the hospital upon the occasion of its Diamond Jubilee, THE FORUM referred to "County" (as the medical and osteopathic staff members each proudly and affectionately term it) as one of the greatest hospitals of the world—great in a physical sense with its acres of grounds, its more than sixty buildings (thirty of them modern), and its 3,850 beds. It was said then that the institution is greater, in a truly traditional sense, because of the service it has rendered through all the years to the tens of thousands of indigent sick and injured of Los Angeles County.

To the osteopathic sector of the medical profession, however, Los Angeles County General Hospital is much more than a great medical teaching unit. In 1928, its Board of Supervisors set aside a portion to be known as the Los Angeles County Osteopathic Hospital (Unit No. 2), developing a bed capacity of 350. For 26 years this osteopathic unit has been known as a teaching hospital of the College of Osteopathic Physicians and Surgeons.

The current issue of THE FORUM carries many of the interesting details of this newest and most significant osteopathic project, including a reproduction of the architects' drawing of the building

to be made possible by the proposed bond issue. Our readers are urged to acquaint themselves with these plans by reading THE FORUM story.

The osteopathic profession nation-wide has long been proud of the record of the osteopathic unit of old "County." Its pride is fully justified by the worth attached to the osteopathic unit of County by the Los Angeles County Planning Board. That body is responsible in large part for the coordinated building program which has made Greater Los Angeles one of the world's most favored cities. Now the Planning Board says that the osteopathic unit of Los Angeles General Hospital is worthy of a great hospital of its own, to be made a rightful peer of the medical unit, the two units to constitute not only one of the world's greatest teaching hospitals, but one of the world's most unique.

But it is not enough that the voters of Los Angeles County shall direct the issuance of bonds to cover the replacement of the old osteopathic structure by one comparable to the medical unit of their magnificent County Hospital. The new unit will be more than a test of the foresight of one of the earth's greatest population centers to provide properly for its vast building needs, or of its social vision that its thousands of unfortunate and underprivileged shall have good medical care, and even more, a medical care that is distinctive in its character.

A sharply decisive mandate from the voters of Los Angeles County will say not alone to its own people, "Osteopathic medicine is an integral part of health care"; such a victory will say to all the people everywhere, "Osteopathy is not separate from the continuum of medicine in any way. Osteopathy is neither to be subjected to discrimination nor is it to be given special favors. It is to have its just due and rightful opportunity to serve."

A wide majority for the $9,200,000 bond issue in Los Angeles in November will mean much more than the completion of a long-contemplated building program insuring a new and much needed hospital, much more than adequate hospital facilities. It will mean a total victory for osteopathic medicine of such character and scope as never before achieved.

The qualified voters of Los Angeles County probably are better acquainted with osteopathy and its doctors than those in comparable population areas elsewhere in the United States. But even they cannot be expected to possess a wide knowledge of the significance of osteopathy in this particular instance. Indeed this lack of information may well be true of many friends of osteopathy and its doctors who live in the area.

It is certainly not too much to ask of readers of THE JOURNAL to write their lay friends and acquaintances living in California—not alone in Los Angeles County—to become aware of the importance of this General Election Day in Los Angeles County to osteopathy throughout the nation. These friends in California should be urged *to urge* in turn their friends in Los Angeles County to vote "yes" on their proposed bond issue. What you can do for your profession as an osteopathic physician anywhere in America—or Canada—is just that simple. It is such an easy thing to do, and one so freighted with decision for this profession that it becomes a challenge to every doctor of osteopathy to bestir himself!

Notes and Comments

Open fracture is a common hazard of rural life, and proper treatment will not await consultation with or treatment by the specialist. The responsibility of the general physician who first sees the case is to render effective initial care that will prevent infection and secure maximum function. A practical plan for adequate treatment is presented in the July, 1954, issue of *General Practitioner*, by L. F. Peltier, M.D. Since such patients are usually seen first at the local hospital, the author emphasizes the importance of a rapid over-all survey of the patient's condition, especially to confirm the presence or absence of shock (an accompaniment of major bone fracture). It is usually due to the presence of the unreduced fracture rather than blood loss; hence proper care of the fracture is primary.

Debridement is the *first* step, looking to the removal of all foreign material—a source of contamination—and the further removal of all nonviable tissue or tissues injured beyond ready repair. *Second*, internal fixation of the fracture is to be avoided if it is possible to secure reduction and immobilization by conservative means—traction or plaster of paris dressing. If internal fixation is necessary, the simplest method that will secure satisfactory results should be selected. *Third*, whether to close the wound primarily or to pack it open will tax the physician's judgment. *Fourth*, the technic of immobilization that will best maintain the fracture in the position of reduction should be used. The physician will not forget that the purpose of immobilization is twofold: to heal the soft parts as well as the fracture. Elevation should be employed to assist in the preservation of adequate circulation. Antibiotics used prophylactically are part of the necessary treatment—the author suggests a combination of penicillin and streptomycin to be continued until the wound has healed solidly. Tetanus prevention is an essential part of care. Gas gangrene is a possibility with vascular injuries and the presence of masses of ischemic muscle, but antiserum is used only in the treatment of an established gas gangrene infection.

The article is valuable not only because of its excellent resume of treatment, but also because its pub-

lication is a reminder that the rural doctor especially should have a regimen of treatment well thought out for these increasingly common types of emergency. Mounting highway accidents and the increased use of power machinery on the farm are both factors in the increase.

★ ★ ★

The antivivisectionists are now giving a new angle to their campaign, emphasizing "regulation" rather than "abolition." A recent article published in *The Humanist* points out that the demand for "regulation" of animal experimentation is based on two false premises: (1) that cruel practices are now common and (2) that regimentation and suspicious snooping would accomplish a useful end. The American Humane Association on the other hand seems to be pursuing a new policy toward animal experimentation and the scientific community. It has made no such announcement but has apparently come to be interested in those aspects of the law that govern the care of laboratory animals rather than its former blanket opposition to bills providing for the experimental use of animals rescued from slaughter in public pounds. The National Society for Medical Research (the A.O.A. is a national member) recently reaffirmed its willingness to open doors for legitimate humane workers, to help the A.H.A. assemble information about animal research, and to cooperate in the development of better methods, better education, and better codes for the care of laboratory animals. It is important that osteopathic physicians know these facts in order to advise their patients who may be misled by the well-intentioned but strangely warped people who would bring medical research to a standstill. The Kansas City College of Osteopathy and Surgery is just completing its new animal house which meets all the requirements for a modern housing unit of this type.

★ ★ ★

"The Trans-Membrane Reaction," an article reporting a project completed by R. H. Beutner, Ph.D., Associate Professor of Pharmacology at the Des Moines Still College of Osteopathy and Surgery, was abstracted for the *Federation Proceedings*, volume 13, March, 1954.

★ ★ ★

"Pharmacy: Plans, Equipment, Supplies, Organization, Minimum Standards," a publication of the U.S. Department of Health, Education, and Welfare, has been prepared to assist hospitals (fifty to 200 beds) in designing and stocking a pharmacy department. The bulletin consists of only forty-two pages but there is a wealth of material, including a list of suggested drug and chemical preparations essentially basic. Quantities to be purchased are advised for fifty-, 100-, and 200-bed hospitals on the basis of a 30- to 60-day period. Order from the Superintendent of Documents, Government Printing Office, Washington 25, D.C.

★ ★ ★

Physicians have long known that there is a relationship between stress and success in life. Researchers in the field have pointed out in the past that little was actually known about the relationship. During a recent meeting of the Congress on Industrial Health in Louisville, a panel of experts presented a number of impressions which they held in common about the connection of stress and strain to the increase in cardiovascular-renal disease.

These physicians agreed on such underlying facts as: (1) more than one-half of the deaths in the United States are due to cardiovascular-renal factors, (2) that our aging population is prone to cardiovascular-renal disease, and (3) the death rate in the United States from these causes among men over 45 years old is higher than in other countries.

★ ★ ★

The eminent physicians who made up the panel, headed by William P. Shepard, M.D., of the Metropolitan Life Insurance Company, New York, agreed that such disabilities as neuroses, hypertension, asthma, and gastric ulcers are on the increase, conditions which are thought of as being psychosomatic in origin.

They held occupations to be in part responsible for these disabilities which appear to be primarily psychosomatic, but which may be as death-laden as cardiovascular-renal conditions. They pointed out that the stress and strain of modern living are causative factors in the increase of diseases that appear to be psychosomatic and of those that seem primarily organic in origin.

★ ★ ★

Against the background of the above facts and impressions the panel raised certain interesting and as yet inconclusively answered questions: Why are more men than women affected by these factors? Why do executives more than laborers seem to be affected? Is work itself harmful? The physicians were agreed that work itself is probably not harmful but an individual's reaction to his work may be.

The question of the increased morbidity of the executive compared to the laborer could be due in part to changes in the work habits of the two groups. The laborer's working conditions have improved tremendously; he has, in most instances, a vastly improved working environment and many "fringe" benefits. A much greater security spells much less stress.

Executives, overloaded for the last few decades, are now subjected to pressures from every angle of their lives. They work too hard and too long; they play just as hard. They eat too much every day and too often drink too much.

These panel authorities did not underplay the stress which arises out of the insecurity of the times and the resultant effect that is primarily emotional. They did emphasize that we must not underrate certain fundamental physiologic factors.

★ ★ ★

These physiologic factors were made more plain by the presentation of research now underway in the Department of Metabolic and Endocrine Research at Michael Reese Hospital in Chicago. Animal experiments made there, as presented by Dr. Maurice S. Goldstein, assistant director, outlined the physiologic mechanism related to stress and shock. These studies

revealed that an intricate mechanism enables the animal body to meet strain and that the mechanism is physiologic for it can be seen. In an animal as complex as a dog, and in the much more complex human body, this mechanism is extremely intricate and is influenced by the cortex or the mind.

Dr. Edward L. Bortz, chief of medicine, Lankenau Hospital, Philadelphia, another member of the panel, told the group that the best thing that people could do was to follow the simple common sense rules of healthy living.

The physician who prescribes for his patient these "common sense rules" will certainly have better success in his medical care if he not only provides a written regimen of living but also if he brings to his intelligent patient the scientific basis that lies back of so simple a method of treatment. Effective medical care, not merely curative medicine is, in part, a way of life.

★ ★ ★

All physicians should avail themselves of the monthly *Public Health Reports.* Medicine's growth in social approach and significance is now reflected in this very excellent source of health information designed especially for physicians and ancillary workers. The periodical, published since 1878, in its present form is an amalgamation of publications of the P.H.S. A year's subscription can be obtained by writing directly to the Superintendent of Documents, Government Printing Office, Washington 25, D.C., and enclosing a check or money order for $4.25. A copy should be found in the library of all osteopathic hospitals responsible for intern and resident teaching programs.

★ ★ ★

The practice of medicine has become remarkably focalized around hospitals in the last 15 years. That single best source of medical statistics, the *Statistical Bulletin* of the Metropolitan Life Insurance Company (June, 1954) records 20,000,000 as admitted in 1953 to the 6,840 hospitals in the United States registered by the American Medical Association—a figure that does not take into account the many patients admitted into institutions not registered by the A.M.A. or the American Osteopathic Association. Population growth is a relatively minor factor, the *Bulletin* points out, since the increase in annual admissions per 1,000 has risen from 57 to 126 between 1934 and 1953.

★ ★ ★

Despite the need of many more hospitals, American babies are largely born in hospitals, 9 out of every 10 at present. Twenty years ago more than 6 out of every 10 were born in the home. The *Statistical Bulletin* estimates that an all-time high in hospitalized births was reached in 1953, about 3,600,000. Proportionally, deaths occurring in hospitals had increased to 45 per cent by 1949 (latest data available). More than one third of all the deaths from cardiovascular-renal disease (the dominant death factor) took place in hospitals.

★ ★ ★

Several factors account for this tremendously increased use of hospital services: Favorable economic conditions; wide voluntary hospital insurance coverage both individually and groupwise; and the adequate facilities and services offered by institutions, such as laboratory and x-ray, adequate medical personnel, and other aids for diagnosis and treatment. The American people have become hospital-minded, convinced that an institution is the best place for full medical care.

★ ★ ★

General physicians are seeing more and more patients who are victims of cardiovascular disease of the emergency type, especially cases of coronary artery disease. Rural physicians without readily accessible consultants must often be responsible for patients from their first episode through the entire period of aftercare. The July, 1954, *Annals of Internal Medicine* presents a useful article by J. G. Kaufman, M.D., and M. C. Becker, M.D., on their method of rehabilitation in acute myocardial infarction, employing a conservative modification of early ambulation. General practitioners, however, are still prone to recommend 4 to 6 weeks of bedrest, often resulting in a psychologic state in the patient that becomes more difficult to treat than the organic disease itself. Now that treatment of the stage of attack is so well standardized, more emphasis is being placed on a regimen of rehabilitation.

The authors are guided in their rehabilitation program by the individuality of the patient's episode. Given a mild case with a small infarct—complete relief of pain after 1 or 2 injections of morphine and lack of shock, fever, failure, or arrhythmias—the patient is given only 2 weeks of bedrest. Cases with shock, failure, and arrhythmias require 4 to 8 weeks of bedrest. The patient is then strictly confined to a chair for a week. Commode use is recommended routinely for mild cases.

The patient is discharged from the hospital after he is permitted to walk but he remains at home for a month or two. At the end of that time he is allowed to go back to work—the authors observe that too often the patient is restricted longer than necessary.

The authors permit leisurely stair climbing. They do not believe that ground-level homes are necessary, since recent studies have shown that ascent of stairs requires only slightly greater effort than walking on level ground. The patient will soon learn to determine his own optimum pace.

Figures are quoted illustrating the high percentage of patients that return to work without apparent harm. In the authors' series of 200 cases about 75 per cent were found re-employable.

★ ★ ★

In Briefer Form.—A 200-bed transportable hospital for use in atomic bombing or other high-casualty emergency is now available for $26,435. The Federal Civil Defense Administration is attempting to interest states and cities in stockpiling these units. . . . A recent study shows that persons with bulbar poliomyelitis give a history of tonsillectomy more frequently than do persons with other forms of poliomyelitis. If a clinically recognizable poliomyelitis develops in a person who has had his tonsils removed, the likelihood of bulbar involvement is four times greater than in one whose tonsils are in situ.

Occlusal Dysharmonies as Related to Cranial Nerve Syndromes*

MATTHEW EISENMAN, D.D.S.
Wilmington, Del.

INTRODUCTION

The physician and the dentist alike regard the health problem as their greatest concern; that either should attempt diagnosis or remedy without regard for the total welfare of the entire body is unthinkable. Ideally, then, they should consult each other in the management of ailments peculiar to the practice of each, particularly on questions of biologic comprehension regarding the mouth.

The competent dentist knows that his therapy has just begun when he extracts a diseased tooth. He must next restore the mouth to its normal masticatory function. This biotic usefulness of the teeth has been long overlooked by the medical profession. Actually, there exists a natural interrelationship between the medical and the dental professions in regard to the biologic significance of the tissues and functions of the mouth in health and disease. In the evidence which I am about to submit, I will emphasize the part improper mastication plays in certain degenerative diseases of the body and, furthermore, how the medical and dental professions must work closely together if normal physiology is to be restored.

In the last decade a great deal of work has been done toward improving technics in the field of dentistry in order that the patient can receive the benefit of proper mouth function so vital to his health. In each case there must be a sound basis for treatment to restore the essential functioning mechanism of chewing. In comprehending the role of the mouth as a chewing apparatus, we must consider the thirty-two teeth as a single unit constituting the masticatory apparatus rather than as individual teeth. We must recognize that disorganized or misdirected masticatory forces can produce tissue breakdown which may be halted by the re-establishment of proper harmonious relationships within the dental unit. This paper is a discussion of the poorly understood complexities of dentistry such as the function of chewing, cranial nerve syndromes, temporomandibular mechanics, and several other factors which will be shown to have a direct bearing on the problems of the many who have become chronic patients in doctors' offices.

A new specialist in the field of dentistry is the reconstructionist or mouth rehabilitationist. He employs those procedures used in restoring the occlusion function and esthetics of broken-down mouths. His title implies the use of coordinated effort to restore the maximum harmony in occlusion and esthetics, instead of filling cavities and spaces. His work includes cases requiring changes of vertical dimension by means of bite raising, cases involving incorrect relationships in opening and closing of the jaws, and cases in which rebuilding of broken-down teeth is the sole procedure. This new specialty involves every dental procedure from the diagnosis of malocclusion to selective grinding, ridge and gingival surgery, operative dentistry, fitting of partial dentures of the fixed and removable type, and root canal and periodontal treatment. For every procedure the goal is the same—establishing and safeguarding the health of existing teeth, establishing for each mouth a maximum functioning occlusion, and attempting to replace that which the patient should or would have if no interfering forces had acted on the occlusion.[1]

STRUCTURE AND STRUCTURAL DEVIATIONS

Sicher[2] speaks of functional analysis of the facial skeleton, a helpful concept for the purposes of this discussion. In a study of the functional or mechanical adaptation of the skeleton, the bones of the face are of great interest, partly because of the striking differences between the upper and lower jaws and partly because of the presence of the pneumatic cavities in the upper facial region. This is very important to us as dentists and very important to those of us who are desirous of treating malocclusion and eliminating syndromes of various cranial nerves. He[2] says that because of the pneumatic cavities in the upper facial regions, it is necessary to remember that the septum is straight in normal individuals of normal birth.

In the absence of habits such as mouth breathing and thumb sucking or traumatic injuries to the palate, the normal palate is round. In thumb sucking it is believed that the palate moves and has a distorted position during growth, coming more or less to an apex, and in this new abnormal position there is a collapse or narrowing of the maxillary arch, a likely factor in the production of septal deviation. Since the normal septum is straight, the turbinates are in correct relationship and in correct position in the skull, and the pneumatic cavities in the upper facial region act as a partition and as a strut in supporting part of the skull.

In speaking of the relationship of the mandible to the skull, Sicher[2] states that the mandible possesses a thick cortical layer of compact bone which is further strengthened along the lower border, but the upper facial skeleton, which is anchored to the cranial base, gains its reinforcement in certain areas from strong pillars. Why cannot the septum be considered structurally as a strong pillar? I feel that it *is* a strong pillar. Furthermore, Sicher states that between the trajectories formed by the pillars, the bones remain thin and form the walls of the various cavities. The septal pillar forms a thin wall which separates the nasal cavities.

*Presented at the annual convention of the Eastern Osteopathic Association, New York, March 27-28, 1954.

Structurally, the upper jaw and facial skeleton form a unit anchored to the base of the skull. On each side there are three vertical pillars, all converging on the basilar part of the alveolar process and abutting the base of the skull. The three pillars, the zygomatic, pterygoid, and canine, are not straight because they have to curve around the nasal cavity and the orbit, thus necessitating the presence of horizontal connections which act as buttresses. The most important pillar is the pterygoid pillar, or pterygoid process of the sphenoid bone. Its lower end is joined to the maxillary alveolar process by the interposed palatine bone; its upper end is anchored directly to the base of the skull.

Premature loss of sixth-year molars results in deformity (migration, extrusion, intrusion, mesial or lingual inclinations) which may be greatly increased by the greater number of teeth posterior to the loss. Furthermore, this deformity may be caused by premature loss of other teeth, possibly loss of the twelfth-year molar. In the opinion of Snyder[3] and Cathie,[4] the deformity from premature loss of one or more posterior teeth and concomitant abnormal dental function distort vascular and nervous structures to the extent that there may be tissue breakdown in the nasal passage filter upon which the nutrition of the entire sinus area depends. As dentists, we were not aware of this and did not realize the extent to which dental abnormalities could affect the function of the nasal cavity.

In cases of premature bite distortion or premature loss of posterior teeth associated with syndromes of the fifth to the eleventh nerves, we must be able to locate and palpate the pterygoid processes of the sphenoid bone, which can be found behind the upper third molars. Unilateral or bilateral tenderness which may be elicited during such palpation is considered diagnostic of the dental lesion mechanism with which we are concerned. In normal breathing, the horizontal plate of the palatine bone has a floating or rocking action which can be palpated by the index finger during the diagnostic motion test.

Fixation of the pterygoid process and the horizontal plate of the palatine bone with resultant pain over the pterygoid processes indicates that a shift has taken place producing fascial stress and strain which involves such important structures as the carotid sheath.

Snyder[3] points out that a great aid to the diagnosis of the distorted bite is a thorough study of the patient's facial characteristics. One orbit may be well rounded, while the other may appear flat. This finding may be associated with a lesion of the maxillary bone with the sphenoid, which must be corrected before the dental work is begun. This is accomplished by slowly springing the lesioned maxilla with the right forefinger, while the left thumb and forefinger straddle the wing of the sphenoid on the same side. During this correction it is essential for the patient to breathe normally. This sequence of events can be summarized in the following manner: (1) If there is a premature loss of posterior teeth, unilateral or bilateral, at a later date the horizontal plate of the palatine bone is found to sag slightly in association with a shift of the sphenoid. (2) In normal breathing, the horizontal plate of the palatine moves; if there is a lesion it becomes fixed. This movement is felt by the delicate tactile sense and can be observed to be a floating action. (3) The pterygoid process of the sphenoid bone, which can be felt in the mouth behind the third molar, will be tender on either side in most cases of disease syndromes involving the fifth to tenth nerves. (4) The carotid sheath, with the carotid artery, vagus nerve, and jugular vein located within, is affected by fascial tension and pull. This fascial tension and pull plays an important part in creating the syndromes of the vagus nerve. (5) The atlantoaxial lesion can also be palpated in these disorders. (6) Also present diagnostically is a point of tenderness on the spine of the scapula. (7) The fifth to tenth cranial nerves exit from the middle cranial fossa and, in so doing, pierce the arachnoid, pia mater, and dura mater—structures which are exceedingly sensitive to shifts in fascial tension. It may therefore be reasoned that cranial nerve syndromes may result from certain deviations from normal fascial balance. (8) Dysharmonies between centric relation and centric occlusion are traumatic factors; they may be corrected by selective tooth grinding, prosthetic reconstruction, orthodontic correction, and operative procedures.

Before discussing cranial nerves and their syndromes, let us define a syndrome as: "The aggregate of symptoms associated with any morbid process, and constituting together the picture of the disease. The term is employed especially, though not exclusively, in relation to the grouped symptoms of disease of the central nervous system."[5]

The cranial nerves differ from the spinal nerves anatomically and in the way in which they are affected by mechanics, diseases, and toxins. They differ radically among themselves in that two of them, the first and second, are outgrowths from the brain. Some are purely motor, such as the third, fourth, sixth, ninth, and twelfth, while others are analogous to the spinal nerves in having motor roots and sensory roots with ganglia in their course, that is, the fifth, seventh, eighth, ninth, and tenth. Furthermore, the mesial halves of the optic nerves decussate; the trochlear nerve decussates completely.

SYNDROMES OF THE FIFTH NERVE

I shall now consider the syndromes of the fifth nerve. The trigeminal nerve is both motor and sensory in function. The fibers of the motor division supply the masseter, temporalis, internal and external pterygoids, the mylohyoid, the anterior belly of the digastric, and the tensor tympani muscles. Several of these muscles take on new importance in the consideration of temporomandibular joint disorders.[7] The sensory division of the trigemi-

nus arises from the pons and its sensory descending root. It supplies the upper anterior walls of the external auditory canal, the anterior half of the tympanum, and the face and scalp about as far back as the vertical line from the posterior point of the pinna, but the line runs slightly diagonally upward and backward. The lower lateral portion of the mandibular area is supplied not by the trigeminal but by the second cervical segment. The distribution of the three divisions of the trigeminus is subject to a great deal of individual variation. This is evident from section of the separate divisions or after their injections for trigeminal neuralgia.

The clinical syndromes of the trigeminal nerve are numerous, but by far the most important is trigeminal neuralgia, or tic douloureux.[2] The specific etiology of this important syndrome is undetermined. The difficulty is the same as in the differentiation between neuralgia and neuritis in general. Neuralgia is thought to be a functional condition, while neuritis is caused by organic disease of the nerve. Why is trigeminal neuritis an almost unheard-of condition and neuralgia very common? It is probable that the minimal change actually occurring in neuralgia is enough to cause pain but not sclerosis of the interstitial elements of the nerve.

Trigeminal neuralgia is characterized by sudden lightning-like stabs of pain of momentary duration in the distribution of one or more divisions of the nerve. There are associated trigger points, most commonly at the site where the division of the nerve pierces the fascia, but they may also be found in the mouth, frequently on the upper lip. In severe cases, the nerve endings may be so sensitive as to cause the patient to refrain from eating, talking, brushing the teeth, or even washing the face for fear of pain and reflex spasm of facial muscles. It has been said that the etiologic factor may be carious teeth, infections about the nasal accessory sinuses, arteriosclerosis of the vessels supplying the nerve, or tumor of the gasserian ganglion. Other possible causes are aneurysmal tumor of the cerebellopontine angle, meningeal irritations, tabes, and so forth. When the syndrome has once begun, it may cease spontaneously, but it is apt to recur. Patients often have all carious teeth removed, sinuses operated upon, all focal infections cleared up as far as possible, but retain their neuralgia. In cases that show proof of organic irritations, the syndrome is not classical. Thus, in tumor of the gasserian ganglion, the pain is more constant; in cases of lesion within the central nervous system the pain varies, and in cases of aneurysm the symptoms come in bouts, but the pain is more steady during the bout.

An accurate diagnosis is necessary before the therapeutic approach is decided upon. However, removal of infections about the teeth is rational whether the patient has trigeminal neuralgia or not. Great discrimination should be used before deciding on the removal of other foci if they cause no trouble other than the supposed neuralgia. In the last few years various measures have been tried: Heroic doses of thiamine chloride have been administered with remarkable success in a few cases; injection of the separate roots with alcohol has its place; and operations of various types have been performed for the relief of pain without any pretense of discovering the cause. Is it not feasible, therefore, to believe that the causative mechanism may be the sequence of dental lesion, maxillary, palatine, and sphenoid fixation, and finally imbalance of muscular and fascial tension reaching the cranial nerves via their dural outlets?

Herpes zoster in the distribution of the trigeminal nerve is the second syndrome in degree of importance. It has all the general characteristics of herpes zoster elsewhere: the neuralgic pain and the herpetic eruption with monolocular vesicles which are thick-walled. The distribution is most common in the upper division, so that the cornea, forehead, and scalp are affected. This is apt to be destructive to vision and extremely painful. Not infrequently the area supplied by the second cervical segment is also affected so that the entire ipsilateral half of the skull is involved. Hypodermic injection of Pituitrin may prevent further vesicle formation and may even disperse pain. For the relief of pain which is apt to persist and be constant, cobra venom is of distinct value. In some cases it gives relief while in others, even with further treatment in a month or two, apparently the pain is never eliminated, and then opiates are resorted to for acute pain.

The third syndrome is that of trigeminal pain from the lesions of the cerebellopontine angle (tumor of the eighth nerve which irritates the fifth) or from the glioma of the pons or the medulla. While the pain may simulate that of true trigeminal neuralgia, it is generally milder and more constant. These variations depend on the nature of the lesion and its contact with the trigeminal fibers. However, in this category belong cysts, aneurysms, anomalies of blood vessels, and the like which may produce irritation within the brain stem.

The fourth syndrome referable to the trigeminal nerve is that of the motor division. The question is nearly always one of pathologic anatomy in the cerebellopontine angle or within the pons. As a rule, sensory symptoms accompany the motor and are far more important so far as the subjective element is concerned. Unilateral paralysis is characterized by flaccidity of the ipsilateral temporal and masseter muscles. When the jaw drops open, it deviates toward the sound side and the patient is unable to bite hard or chew well on the affected side. The treatment is that of the basic lesion. Spasm of the motor division is seen as trismus in epidemic encephalitis and, in this condition, violent tremors may appear. This gives rise to severe arthritic or erosional changes in the mandibular joints which are exceedingly distressing. Moreover, the patient is apt to suffer from inanition because of the difficulty in mastication.[7]

SYNDROMES OF THE SEVENTH, OR FACIAL, NERVE

The facial nerve is complex clinically because of its course through the bony facial canal, its geniculate ganglion with its sensory nervus intermedius, and its anastomoses. It gives branches to the greater superficial petrosal nerve, to the tympanic plexus, and to the stapedius muscle and receives the chorda tympani from the fifth nerve (carrying fibers) to supply the sense of taste through the nervus intermedius. The submaxillary and sublingual glands also receive fibers from the same nerve. After its exit from the canal at the stylomastoid foramen, it supplies small muscles of the external ear and the occipitalis muscle via the posterior auricular branch. It supplies the posterior belly of the digastric, the stylohyoid, the platysma, and all of the muscles of the face and anterior muscles of the scalp. In this anatomic account, there is no mention of the sensory supply to the ear drum and neighboring region, but that fibers reach it is shown by the appearance of vesicles of herpes zoster in that area in cases of infection of the geniculate ganglion. The facial nerve is frequently affected within the facial canal because of its confinement within narrow walls which permit very little edema without causing paralysis. The syndrome as a whole is called Bell's palsy and may accompany otitis media and all of its complications, including mastoiditis and petrositis. It is strange that at times pus can accumulate in the middle ear to such an extent that the nerve is actually bathed in pus without paralysis resulting. There is much individual variation in susceptibility.

After proper correction of distorted bites, moist eczema and diseases associated with fungous infections and dermatitis are highly amenable to treatment, and Snyder[3] reports that so-called pus in the middle ear which has been running for a considerable time can be stopped with proper treatment.

The nerve is sometimes paralyzed merely by a cold wind blowing on one side of the face, more often by more severe exposure, and frequently by fracture through the petrous portion of the temporal bone. Mastoid operations sometimes result in trauma to the nerves. Drivers of automobiles with the steering wheel on the left side of the car such as most of those in the United States are more susceptible on the left side. When the facial neuritis is localized within the facial canal, the exact site can usually be determined. If the nervus intermedius is affected, the lacrimal glands on the same side cease to secrete, and taste on the affected side is diminished or lost. Infection of the ganglion gives rise to herpes zoster oticus, perhaps confined to the ear drum but at times spreading to a greater area in the canal or on the pinna and even on the tongue. It is accompanied by hyperesthesia of the affected area and may be called Hunt's syndrome. Haymann[8] has described a similar distribution of herpes infections of other ganglia expressed by the multiple innervation of the ear.

Involvement of the nerve center to the stapedius branch causes, in addition to facial paralysis, hyperacusis for low tones because the paralysis of the stapedius permits the tensor tympani (supplied by the fifth nerve) to function unopposed. The sense of taste on the anterior two-thirds of the tongue is also affected. If the tongue is affected below the chorda tympani, taste remains normal. The nerve may be involved outside the facial canal by parotid infection, as the nerve lies in a groove in the parotid gland. Here it is also subject to trauma indirectly or by pressure. In peripheral locations, the fibers of the various portions of the nerve may appear separate.

The auriculotemporal syndrome (Frey's syndrome) is a syndrome of crocodile tears. This syndrome was first described by Frey in 1923. It consists of redness and sweating of one side of the face on eating or even tasting substances on the posterior one-half of the tongue. The mechanical action of chewing does not provoke the symptoms. The syndrome follows parotitis and wounds of the parotid gland. It has been reported that the injection of alcohol into the auriculotemporal nerve will alleviate them or cause the symptoms to disappear.

Gunn's syndrome, or the jaw-winking syndrome, is found almost exclusively in cases of congenital anomalous innervation. There is ptosis of the upper lid sometimes associated with other external ocular palsies, and the affected lid rises and falls with movements of the jaw. The movement of the lower jaw is usually to the opposite side, not to the same side; however, this is not true in every case. Nerve anastomoses have been reported to achieve relief.

Bell's palsy is the common syndrome of the seventh nerve, and the general appearance of the face is indicative. Lesions of the nerve are characteristic, and whether the lesion is supranuclear or of the lower motor neuron can usually be noted at a glance. In the former, the fibers of the forehead escape unless the patient has trained himself to unilateral wrinkling of the brow. This is because bilateral functions are mediated through the supranuclear coordinating mechanism, but if the patient has learned to avoid the use of this mechanism, he loses its advantage in case of facial paralysis of central origin. In a lesion of the lower motor neuron, the entire half of the facial musculature is paralyzed. The muscles have a flaccid, ironed-out appearance. The patient is unable to wrinkle the brow of the affected side, to close the eye, whistle, or blow out the cheeks. If the eyelids are forcibly held open while the patient attempts to close them, the eyeballs are seen to roll upward and outward—this is Bell's phenomenon. This is normal and may be seen in persons who sleep without complete closure of the eyes. Food accumulates between the teeth and cheek, and the cheek may fold in accidentally so that it is bitten. There is also too little saliva from the submaxillary and sublingual glands and too little lacrimation. The taste fibers may be irritated instead of paralyzed so that the patient complains of a metallic taste in the mouth. The nerve

may be paralyzed for many months and still recover.

There have been reports of cases of Bell's palsy cured by correcting malocclusion and releasing the fascial tension on the seventh nerve when it makes its exit from the stylomastoid foramen of the skull.[3]

THE EIGHTH NERVE AND ITS SYNDROMES

The eighth nerve consists of two distinct parts, the acoustic and the vestibular. They lie together in company with both portions of the seventh in the posterior part of the temporal bone and the internal acoustic meatus and also in their course to the lower border of the pons. Within the central nervous system they have different connections: to nuclei in the medulla which are concerned with hearing and to others which have to do with balance. It has been reported by colleagues of mine that hearing has been improved by correction of malocclusion, but that this should not be the only treatment for hearing loss. However, in cases of involvement of the vestibular branch of the eighth nerve, I have sufficient evidence that I have successfully treated cases by restoring lost vertical dimension and re-establishing proper occlusion. In other words, the prognosis is favorable for patients whose hearing imbalance is part of a syndrome of the vestibular branch of the eighth nerve.

When tinnitus occurs, a thorough general and neurologic examination should be performed. All sources of local and general irritations are removed if possible. Frequently when this has been done, tinnitus will still remain. This is especially true in senility or in the involutional period. Potassium iodide improves the circulation slightly in some cases, and if given in doses of 5 grains three times daily may give relief. Thyroid substance in small dosage sometimes clears up tinnitus, apparently in cases where lowered metabolic state is a factor; however, the mechanism is not understood. May[9] reports relieving tinnitus by correcting improper occlusion in patients wearing artificial dentures.

In a clinical test for hearing, the first question is, "Does deafness exist?" Many patients become deaf in one ear without being aware of it. Many other patients, especially following injury to the brain, feel that they are deaf and label as unfair the opinion that they are not. For these reasons each ear is always tested separately, first with a tuning fork of about 128 cycles per second and then with ordinary voice and whispering, and finally with tuning forks with a high rate of vibration. The audiometer is now in general use. Proof of ability to hear when the patient claims deafness requires skill and sometimes special methods of testing.

The details of labyrinthitis are beyond the scope of this paper, but a few statements are in order from the standpoint of diagnosis. The patient is stricken with sudden severe vertigo, and objects appear to turn in a definite plane, clockwise or counterclockwise, vertically or horizontally. The patient becomes severely nauseated and usually vomits or falls. He may first fall precipitously, as though shocked. If he keeps his eyes open objects seem to dance before him, and for this reason he closes them. Even after he is down, he has a subjective sensation of whirling about and grasps nearby objects for support. If he is lying in bed he may roll out of one side in his efforts to avoid rolling out of the other. Sometimes he feels that the outside world is turning. When he succeeds in getting quiet, he insists on resting on the affected ear and dares not move for any reason. Examination usually has to be made without disturbing that position. The taking of food can be dispensed with, but fluids are necessary, and elimination is a problem in the acute stage. These are the severe symptoms of labyrinthitis, and dentists and physicians should recognize and treat these patients before they develop these severe symptoms. Let me stress that the horizontal plate of the palatine bone and the pterygoid process of the sphenoid bone may lead to the culprit in this particular condition, which may be set right by proper adjustment, vertical dimension, and occlusion, with definite relief resulting. There are many more syndromes of the eighth nerve.

Disturbances of equilibrium from central lesions are quite common in cases in which the vestibular nuclei are affected in the medulla by a vascular lesion. Cerebral lesions are at times accompanied by disturbances of equilibrium, but these are not marked or of long duration except after trauma to the brain, in which case lower centers may have been affected.[10]

THE NINTH AND TENTH NERVES AND THEIR SYNDROMES

The glossopharyngeal and vagus nerves are so intimately associated centrally that they are best described together in the medulla.

The ninth and tenth nerves supply the constrictors of the pharynx, and the ninth supplies sensation to the upper respiratory tract, the middle ear, and the posterior third of the tongue. The majority of the vagus fibers descend into the thorax and abdomen where they supply the viscera with parasympathetic fibers. The vagus is inhibitory to the heart, and its lesions may produce tachycardia. The vagus also gives off the recurrent laryngeal nerve to the vocal cord. Paralysis of the superior constrictors to the pharynx produces difficulty in swallowing solids. Paralysis of the soft palate causes a nasal voice and regurgitation of fluids. The ninth cranial nerve innervates the carotid sinus which has the power to regulate reflexly the height of blood pressure. Section of the ninth nerve for neuralgia results in hypertension. Abnormally irritable carotid sinuses tested by digital pressure may cause cerebral symptoms of dizziness and weakness; even epilepsy has been ascribed to this cause. These effects are presumed to occur reflexly from changes in the cerebral circulation.[6]

Glossopharyngeal neuralgia is a rare but severe type similar to tic douloureux, except that the pain is distributed to the tonsillar pharyngeal

region. The problem of glossopharyngeal neuralgia is the same as that of other neuralgias with equally puzzling etiology. Mechanical irritation in any part of the course of the nerve may be the essential disease, or the pain may be without apparent cause.[12] Again let us consider fascial tension and pull involving these cranial nerves. Since it can readily be deduced from what is known concerning the condition that irritation is a prime factor, the probability of fascial tension is certainly suggested.

It should be noted that the carotid bulb is closely connected with the sympathetic nerves which form a plexus at the carotid bifurcation. The bulb and the plexus together form the carotid sinus. The sinus, the actual existence of which was ignored until a few years ago, is very important not only because of its role in the physiologic regulation of respiration but also for its circulatory function. It regulates the blood pressure and, to a great extent, the depth and rate of systole; this is readily noted clinically by the circulatory and respiratory symptoms elicited by firm pressure upon the carotid sinus. On it depends the distribution of blood to the muscles and viscera through its effect on peripheral vasomotor states.[13] These facts show that the carotid sinus is essential for normal operation of the most important functions of the body, respiration and circulation. The vagus nerve within the carotid sheath and the sympathetic plexus on the outside are so intimately related to the sheath that they must also be affected by forces to which it is subjected. Because of the continuity of the fascia of the sheath with the cranial base, one of the most outstanding forces, therefore, is the type which originates in disturbances of the bony parts of the cranial base. Such intimacy of structures and multiplicity of forces point strongly to the great probability of disturbance of cranial nerves.

SUMMARY AND CONCLUSION

The structure and structural deviations of the facial and cranial bones have been discussed in relation to dental disturbances and cranial nerve syndromes. If dental care includes restoration of posterior teeth before shifting of bones, cranial nerve syndromes will probably be prevented. Physicians should observe the mouths of patients with cranial nerve syndromes in order to discover loss of teeth and migration of remaining teeth.

907 Jefferson St.

REFERENCES

1. Cohen, L. A.: Personal communication.
2. Sicher, H.: Oral anatomy. C. V. Mosby Co., St. Louis, 1949.
3. Snyder, C. P.: Complications of distorted bite. J. Am. Osteop. A. 51:257-259, Jan. 1952.
4. Cathie, A. G.: Fascia of head and neck as it applies to dental lesions; preliminary consideration. J. Am. Osteop. A. 51:260-262, Jan. 1952.
5. Stedman, T. L.: Stedman's medical dictionary. Ed. 18. Williams & Wilkins Co., Baltimore, 1953.
6. Nielsen, J. M.: Textbook of clinical neurology. Paul B. Hoeber, New York, 1941.
7. Greer, C., and Withers, B. T.: Review of Costen's temporomandibular joint syndrome; report of typical case. Texas Rep. Biol. & Med. 6:23-33, Spring, 1948.
8. Haymann, L.: Ueber Herpes zoster and herpetische Erkrankungen im Ohrgebiet. München. med. Wchnschr. 81:137, Jan. 26; 164, Feb. 2, 1934.
9. May, W. B.: Personal communication.
10. Grinker, R. M.: Neurology. Ed. 2. Charles C Thomas, Springfield, Ill., 1937.
11. Barnhill, J. F., and Mellinger, W. J.: Surgical anatomy of head and neck. Ed. 2. Williams & Wilkins Co., Baltimore, 1940.
12. Alpers, B. J.: Clinical Neurology. F. A. Davis Co., Philadelphia, 1949.

Psychiatry and Industry*

CECIL HARRIS, D.O., F.A.C.N.
Philadelphia

The practice of industrial medicine is today a fairly well-established institution. However, the rapid rise of psychosomatic medicine, the changing role in our society of the modern psychiatrist, and the discovery and ever-increasing utilization of the industrial scene as a basis for research studies are creating new demands on the industrial physician and, at the same time, are creating new opportunities for the industrially minded psychiatrist. It is now incumbent upon the industrial physician to refurbish his knowledge of psychiatry. The psychiatrist who is inclined to enter the industrial scene, either on a part- or full-time basis, is treading on virtually untrodden ground. In addition to meeting for the first time the problems, conflicts, and dilemmas with which his colleague, the industrial physician, is already familiar, the psychiatrist, owing to the dynamic nature of his specialty, faces some further complications. The best approach to an appraisal of the situation may be through a brief review of the relationship which medicine, in the guise of the industrial physician, has maintained with industry.

With the trenchancy and succinctness for which the Chinese are noted, they express the matter of economic determinism, as it operates on the individual level, in this manner:

"Whose bread I eat,
His song I sing."

It is the existence of this so often true-to-life fact which makes the position of the industrial physician a difficult one. To describe it, we might paraphrase Wordsworth's "Born under one law,/To another bound"/to read "Educated under one code,/Hired out to another."/For in a laissez-faire state, such as ours essentially is, the primary interests of the entrepreneur, for whom the industrial physician works, are rarely humanitarian except by accident or coincidence. This is not to imply that industry is antihumanitarian—far from it in many, if not most, cases. But throughout the long histories of the arts, of science, and of commerce,

*Presented on October 16, 1953, at the Fifty-Fifth Annual Convention of the New York State Osteopathic Society.

certain areas of antagonism have consistently revealed themselves, antagonisms that can be traced to antithetical motivations.

The unique status of the industrial physician is that his position is precisely in the no man's land that exists between medicine and commerce. His source of income is derived from a person or persons who are primarily controlled by considerations of profit, who think, indeed necessarily must think, in the highly competitive world of present-day business, in terms of production, cost, and efficiency; on the other hand, the "patients" of the industrial physician are, by and large, members of that class of society which thinks, just as necessarily, primarily in terms of higher wages, shorter hours, and improved working conditions.

It would be laboring the obvious to do more, at this point, than to remind my audience that the most noble traditions of the healing profession have always been above intergroup conflicts, even, one might say, indifferent to them. Though physicians are human, and as such have their own aspirations, their problems, their peculiar shortcomings, and their private loves and hopes and despairs, the discipline and ethical code of the art and science of medicine have almost invariably demanded a rigorous professional neutrality where such personal proclivities might conflict with the private interests of the patient or the general interests of society. What the patient does, as a matter of deliberate choice, with the improved health accorded him through the skill of the physician has been a matter strictly outside the sphere of medicine.

I use the words "has been" advisedly in order to emphasize the fact that the lines of demarcation between the areas covered by such precepts are, today, becoming less sharply defined than they were in the past. This is largely the result of two interdependent factors: our increasing knowledge and a changing of our predominant philosophy.

In the dawning of the natural sciences, we first started with two distinct entities—for instance, biology and chemistry—and then, in keeping pace with our expanding knowledge in these two fields, we approached the borderline between them from both directions and so created the science of biochemistry. The same pattern between biology and physics gave us biophysics, that between physics and chemistry resulted in physical chemistry, and so on for the scores of amalgamations we live with and use today, such as electrochemistry, astrophysics, geopolitics, chemotherapy, magneto-optics, photomicrography, and psychosexuality.

Two such modern combinations command our special attention in this discussion. The union of psychology with medicine produced psychosomatics, and a new set of concepts was added to the psychiatrist's armamentarium. And when the middle land between biology and sociology was more thoroughly explored, the scope of psychiatry widened again. Thus the psychiatrist is not only a psychopathologist, but also a biosociologist, which is to say that during the past few decades the role of the psychiatrist has changed from that of a humane warden of the insane to that of a moderator and teacher, attempting to reconcile the demands and pressures of society, on the one hand, and the inherited and acquired traits of the individual on the other hand. This changing role of psychiatry is delineated by Saul.[1]

It is interesting that this role has fallen to psychiatry. The synthesis of psychology and physical medicine into psychosomatic medicine is a logical inheritance, an evolution which reflects our changing concepts of disease, based upon our expanding knowledge. However, the middle ground between biology and sociology is not so clearly a role which psychiatrists are necessarily best fitted to play. It is a position which abounds in many judgments of the type we are wont to call "moral judgments." It is a position that the minister, the writer, the philosopher, the teacher, the legislator, and others have from time to time occupied, and still do. Yet, there can be no doubt that a vast segment of our population is calling upon the services of the psychiatrist to mediate in this uncertain territory. These are persons who have been encouraged by the sweeping advances of modern science, and who have been fortified by the newly acquired knowledge that much of what was formerly regarded as incorrigible behavior can now, with varying success, be resolved into, explained, and treated as manifestations of a conflict engendered by a field of forces comprising the findings of psychology, sociology, and physical medicine. (To these three, some would add a fourth—spirituality, or the domain of religion. Yet, in the wake of the pragmatic wave which has swept over the old philosophies, much that we were used to looking upon as purely questions of morality based upon theology is now being regarded as misunderstood questions of relativity among the trinitarian forces of biology, psychology, and sociology to which the individual is subject. This is not to deny the importance of religion—only to recognize that it is involved in a boundary dispute.) Thus we find psychiatry being applied to such problems as alcoholism and drug addiction, delinquency and crime, accidents, marriage and divorce, in fact, just about every major biosociologic question of the day.

In addition to or perhaps as a consequence of the widening range of psychiatric application, no unanimous accord has yet been achieved within the profession itself, even on many of the fundamentals. Although diverse schools of thought are highly characteristic of a flowering culture, such a philosophic observation is of little comfort to the practicing psychiatrist.

For many years it has been the teaching of certain psychologists that the mature personality is a highly compartmentalized affair, that is to say, the individual, faced with the numerous conflicting views of life with their varying histories and claims of success, has eclectically chosen from among them in accordance with his own characteristics, experiences, and predilections and, once having so chosen, keeps his resultant motley philosophy from tearing itself asunder through its many inherent contradictions by the device of separating, one from the other, the patches that make up the crazy quilt. A case of not letting the right hand know what the left is doing, one might say. Overstreet[2] has analyzed the diverse and contradictory tributaries that flow into the main stream of our present-day concept of the healthy, well-developed, balanced personality.

While on the one hand the compartmentalization theory of personality adjustment has received at least tacit endorsement as the key to mental health in an age of conflict, other writers have spoken of "the logic-tight compartment" as a personality defect, an obstacle to be eradicated before mental health can be achieved through integration. The distinction as to whether a compartment is an adaptive mechanism or a formidable obstacle seems to lie largely, like beauty, in the eyes of the beholder.

Nevertheless the search for objective criteria in the field of human relations, a field notorious for its rampant subjectivity, continues to go forward. In the meantime, the lack of stable, objective standards constitutes just one more of the many factors which makes the psychiatrist's entry into the industrial field fraught with considerably more precariousness than that of the ordinary industrial physician. Not only is the psychiatrist subject to the same cross fire between labor and management, but he faces the further pitfall of being expected, in fact of being paid, to render opinions on matters which are frequently, in the state of our present scientific knowledge, opinion-proof. In brief, the increasing and somewhat urgent emphasis on psychosomatic medicine, the role into which the modern psychiatrist has been cast as an oracle of social wisdom, the increasing industrialization of our society, and, in particular, the employer-employee relationship which exists between industry and the industrial physician all strongly tend to subvert the industrial-minded psychiatrist (or the psychiatric-minded industrial physician), occasionally turning him, wittingly or unwittingly, into an apologist for industry management.

That the industrial physician is most generally regarded as a member of management is almost axiomatic. Schuster,[3] in a masterly and scholarly appraisal of the human relations involved in industrial medicine, unequivocally states as much as a fact, and, for my part, I would hardly disagree. Kessler[4] thoroughly discusses the question of whom the industrial physician should work under.

The grossest example in our age of the subversion of medical "science" is undoubtedly that of Nazi Germany — not only the tragically grotesque race theories, but the appalling amount of human experimentation that took place by depraved and conscienceless members of the medical profession. A historically closer example of the distortion of science to private interests is contained almost daily in the dispatches from Soviet Russia. So fantastic are some of these claims that they are ludicrous—the kind of claims that inspire cartoons such as the drawing of a research laboratory peopled by a couple of Russian scientists. Outside the windows can be seen a few mosque-shaped buildings and a steeple surmounted by the Russian star. One of the scientists is talking on the telephone, and the other is standing by, beaming in a cat-ate-canary fashion. The caption, part of the telephone conversation, is: "Hello. Boris? Listen. Comrade Zherkov has invented something. . . . No, no, I mean *really* invented something!"

What I would now call attention to is that we must not, to even a slight degree, fall into the same error here. The function of medicine still remains to cure the maimed, and the halt, and the blind and, in the field of psychiatry, the psychotic and other obviously deranged or disordered individuals. Psychiatry must not corrupt its function by allowing itself to be forced into either a blanket approbation or condemnation of any ideology.

I single out, on both rationalistic and empiric grounds, the industrial psychiatrist as being in the greatest potential danger of spearheading such a corruption. Rationalistically, he is in the same danger that the American Medical Association foresees as the outcome of socialized medicine, the same danger that causes numerous educators to decry any interference, governmental or otherwise, with academic freedom. The American counterpart of the Chinese epigram quoted at the beginning of this talk is, "He who pays the piper calls the tune." The customary financial independence of the American physician is undoubtedly responsible to a large extent for the rapid and high development of medical science in the United States and the respect it commands throughout the world.

Empirically I have cited the industrial psychiatrist because I have read numerous accounts which unmistakably show the signs, early and late, of such backsliding. Almost any relatively complete bibliography on industrial medicine will include examples. I do not know that psychoanalysts, as a group, are more or less prone to this failing, but Weinerman[5] has adequately refuted some of their fallacies in respect to the industrial field.

The medical literature, in those infrequent cases where it reports labor's side of the picture, occasionally discloses a mild suspicion directed toward industrial medicine. I do not doubt that such suspicions are sometimes well founded. Two articles on this point by Read[6,7] are elucidating.

What, for instance, are we to say to the practice, which is far from infrequent, of encouraging employees to report to the plant dispensary with whatever medical problems they may have, and then of using carefully kept records of such visits as a basis for discharging them, employees whose only failing is one of falling statistically on the wrong end of the chart? I personally find such a practice reprehensible. This makes industrial medicine the "fall guy" of the hardened (and, I might add, shortsighted) personnel manager. Hardness in the form of a callous disregard of the dignity and worth of the individual may be a short-range success-assuring attribute in a personnel worker; I find it singularly unbecoming in a physician, even more so in a psychiatrist. Although management pays his salary, the industrial physician should not, as part of his services, betray the confidences of his patients. The hippocratic oath is pointedly specific in this respect.

Not only do I dislike the underlying ethics of such a method, but even its logic is not foolproof. The degree to which various persons respond to instructions regarding the treatment of injuries varies considerably. We have all experienced the full range, from the patient who calls a physician to remove a small splinter to the one who walks around with double pneumonia and a 105-degree fever and stoutly maintains his claim to sound health even as he lapses into a coma. To purport to show a correlation between such various sensitivities, compounded as they are of so many diverse elements, and the working efficiency and

productivity of the patient is sheer pseudoscience. Yet, as I say, such practices are far from infrequent.

A personal illustration, related to me by a friend, points up the moral. This friend's 10-year-old daughter, after a long period of eager anticipation, had joined the Girl Scouts. Although her enjoyment of the experience was evident, she frequently related its many gratifying aspects to her father. Then came the day when she violated a rather long-standing rule of the household. Her father, soberly discussing the matter with her, and casting about for a means of impressing upon her the seriousness of her defection, told her that, if it happened again, as punishment she would not be allowed to attend the next Scout meeting. Precipitately, tears welled up in the little girl's eyes. Consternation overtook the father, and he began a retreat by hastening to explain that there was no need of her repeating the offense, and thus she could avoid the awful fate of missing a meeting.

"It's not that," the little girl sobbed.

"What then?" replied the now thoroughly confused parent.

His daughter answered, "It's just that *first* I tell you how much I *like* the Scouts, and then when you want to *punish* me, you know *just what to do.*"

Would that some physicians had as keen and elemental a sense of justice as this 10-year-old child!

One of the most egregious practices of which industrial physicians are guilty, whether by choice or not I cannot say, is that of disregarding the privacy which every patient has a right to expect in his relationship with a physician. Too often the plant dispensary resembles an extension of the factory assembly line. Such willy-nilly herding together of patients may be justified in time of war on the part of an overburdened draft board; such mass-production methods are out of place in normal life. If an industrial plant cannot, or will not, afford the same minimum safeguards for the medical privacy of its rank-and-file employees as those which, the literature shows, are oftentimes elaborately afforded the management group, I would deny its right to the advantages of an in-plant medical service. This is not a matter of differential economics, but of universal medical ethics. More than once have I seen a wearer of a prosthetic device or a victim of some other private disfigurement have to stand in the nude and submit to the gaze and remarks of the ignobly curious among his fellow examinees. Some, it is true, have no sensibilities about such an experience; to others it is a minor ordeal—and to my way of thinking, an undignified and unnecessary one for a job applicant to have to undergo. Occasionally psychiatric interviews are shockingly devoid of privacy. In such cases, insult is added to injury; not only human dignity is at stake; sound therapeutics is jeopardized. Bendix[8] has written an excellent article on this subject.

Conversely it has been my pleasure to visit plant dispensaries which were models of neatness, efficiency, and decorum. One plant I recall was located on the outskirts of Philadelphia. The dispensary was only three small adjoining rooms, but solid construction and heavy, attractively styled doors gave ample privacy. Even during the hectic days of the war, when plant expansion and the labor shortage were simultaneously growing in opposite directions, the flow of patients undergoing their initial physical examinations was quiet, orderly, and not lacking in respect to the employee's interests. Only that number of patients that could be conveniently handled in a session were scheduled. To minimize unnecessary waiting, each patient was given a specific appointment, the doctor was there on time, and the examinations proceeded on schedule. As one patient left, another was admitted. Last year this company had a net income of over 68 million dollars, and I would not be at all surprised to learn what I already conjecture, that its employee turnover rate is one of the lowest in the entire industry.

So far I have expounded mainly the negative aspects of industrial medicine and psychiatry. Now for a look at the other side. The widespread prevalence of industrial medicine has undoubtedly contributed to our national health. Cursory as some examinations are, they have, by their ready availability and freedom from cost to the patient, brought better medicine to more people. The literature provides ample evidence of the usefulness of such services in discovering remediable diseases in their early stages.[9]

The maintenance of our national economy through the maintenance of the health of its workers is no mean and petty task. To the individual worker such service often means the difference between the cramped life of invalidism and financial dependence and the full life of social usefulness and financial security. The industrial neuropsychiatrist is daily achieving more deserved prominence in this role. Despite the widespread nodding acquaintanceship with psychiatric terms and concepts which the average man-on-the-street possesses, the state of this branch of medicine is still as much an art as a science, and early diagnosis of the various types of mental illnesses likely to be encountered in an industrial plant is a subtle, and seemingly dramatic, skill. Here the detailed records of the worker's activities in the factory may find a legitimate use as a diagnostic aid. But, except in the case of the few manifestly dangerous conditions uncovered in the course of industrial psychiatric examination, I still contend that the identity of the patient should not be revealed to management without the worker's consent.

In an effort to combat even an unintentional exploitation of the worker in this respect, I would suggest to the private general practitioner that when a patient comes to him as the result of a suggestion on the part of an industrial medical service, the physician should be careful not to assume the patient's consent to the transmission of the type of medical information generally held in confidence by the physician. The stigma which, despite educational advances, still prevails about certain aspects of psychiatric treatment makes such a caution all the more realistic in such cases. Luongo[10] discusses this matter in an article dealing with the relationships between the two types of physicians.

In contrast to the marginally moral practices of those industries which debase the dignity of the worker and the medical profession alike, there are many instances where the industrial physician,

with the understanding cooperation of the industrialists, has been highly instrumental in providing jobs for handicapped persons by means of a careful evaluation of the patient's capabilities and a correspondingly careful study of the requirements of the various positions in the plant. (A highly detailed program for assuring such harmony between the worker and his job is reported by Hanman.[11]) When the handicapped, including those classifiable as psychiatric disabilities, are so employed, the records are almost unanimous in showing their scores to be proportionately better than or at least even with those of the normal worker on the same job.

By way of example, Fowler[12] recounts what can be done in the case of diabetics, and Kingsley and Hyde[13] give a refreshingly hopeful slant on a class of patients which frequently comes to the attention of the industrial psychiatrist—the mentally deficient.

In the same sense that employee records are frequently a useful adjunct in the diagnosis of relatively obscure psychiatric ailments, such records, because of the care and completeness with which they are kept, are also sought after by students of behavior as raw material for statistical studies. The industrial scene is unique in many respects, particularly for psychiatric studies. The ready availability of the subjects is not the least of the advantages. Two examples of what can be done with industrial statistics are Creed's report[14] on the relationship of recreational participation to industrial efficiency and Owen's study[15] of the contributions of vacations to employee health.

Here again, in the matter of research, the resultant report is not likely to be much better than the motives which guide the research. Sometimes, in an effort to elicit the cooperation of management, a researcher may unintentionally oversell the prospective benefits of such a research project to management. A viewpoint distorted by too many preconceptions, too rigidly preconceived, is the likely result. The libraries are full of such articles, and, far from revealing new scientific truths, they read like paid testimonials, which, in essence, is just what they are. But where management has possessed an enlightened point of view, sufficiently enlightened not to cripple the research by the imposition of compromising restrictions, and where the private interests of the employees who participated in the research have been adequately protected, some commendable and revealing studies have resulted. And sometimes, in more ways than could be foreseen at the start of the study, the industry has benefited highly, even apart from the good will it has created.

When an industrial medical position can be found which is largely devoid of the many detractions I have discussed, the advantages loom large indeed. Regular hours, certain financial security, diversified practice, and ready opportunity for research are a few of the advantages. Franco[16] has given a good account of the diversification offered in industrial practice. This article also details the steps taken to insure the patient's privacy. Martins[17] has described physical deviations encountered in examining more than 500 men.

Mayers,[18] who has investigated the educational facilities available to physicians who wish to specialize in industrial practice, is not very encouraging. However, she offers several constructive suggestions and the hope that in the near future such courses may be added to the medical school curricula.

Whatever future historians may say about the twentieth century, it is my guess that they will not fail to note that it was an age of great and rapid change. The new importance accorded psychiatry is just one instance of this trend. Occurring as it does in an era of extensive industrialization, it is only natural that we shall see an increased utilization by industry of the insights which psychiatry is in a position to offer and an increased application of psychiatric practice in industry. To those who are attracted to this calling, I have tried to point out some of the pitfalls which they may rightly expect to find along the way. And I have tried to redefine those principles which, by their steadfast service since the time of Hippocrates, have proved themselves such guardians of the ideals of the medical profession that they may rightly be depended upon to bring about an equitable stabilization between the interests of medicine and those of commerce, to the mutual benefit of psychiatry and industry, of management and labor, and of medicine and mankind. The achievement of this goal is the challenge which the situation offers to the psychiatrist. Upon his successfully meeting this challenge in these highly critical days, the future courses of both industry and psychiatry may, to no small extent, depend.

Central Medical Bldg.
18th and Chestnut Sts.

REFERENCES

1. Saul, L. J.: Bases of human behavior; biologic approach to psychiatry. J. B. Lippincott Co., Philadelphia, 1951.

2. Overstreet, H.: The mature mind. W. W. Norton Co., New York, 1949.

3. Schuster, G.: Human relations in industry. Brit. M. J. 2:505-510. Sept. 11, 1948.

4. Kessler, H. H.: Symposium on how industrial medicine can meet needs of American worker: viewpoint of physician in industry. Arch. Indust. Hyg. 3:185-187, Feb. 1951.

5. Weinerman, E. R.: Accident-proneness: a critique. Am. J. Pub. Health 39:1527-1530, Dec. 1949.

6. Read, H.: Can management, labor and medicine work together for health? Arch. Indust. Hyg. 1:46-53, Jan. 1950.

7. Read, H.: Symposium on how industrial medicine can meet needs of American worker: viewpoint of union. Arch. Indust. Hyg. 3:188-191, Feb. 1951.

8. Bendix, R.: Symposium on how industrial medicine can meet needs of American worker: viewpoint of sociologist. Arch. Indust. Hyg. 3:177-180, Feb. 1951.

9. Results of effective tuberculosis control program [of Metropolitan Life Insurance Company]. Statist. Bull. Metrop. Life Insur. Co. 33:3-6, May 1952.

10. Luongo, E. P.: Relationships between industrial medical department and private physician. Arch. Indust. Hyg. 1:452-457, April 1950.

11. Hanman, B.: Matching physical characteristics of workers and jobs. Indust. Med. 14:405, May 1945.

12. Fowler, A. F.: Diabetes in industry; diabetic in employment. Indust. Med. 19:283-284, June 1950.

13. Kingsley, L. V., and Hyde, R. M.: Health and occupational adequacy of mentally deficient. J. Abnorm. & Social Psychol. 40:37-46, Jan. 1945.

14. Creed, C. E.: Relationship of recreational participation to industrial efficiency. Research Quart. 17:193-203, Oct. 1946.

15. Owen, M. D.: Contributions of vacations to employee health. Indust. Med. 19:192-197, April 1950.

16. Franco, S. C.: Periodic health examination of executives. Indust. Med. 19:213-218, May 1950.

17. Martins, J. K.: Physical deviations in 501 consecutive male examinations. Indust. Med. 19:1-3, Jan. 1950.

18. Mayers, M. R.: Industrial health in undergraduate medical curriculum. Arch. Indust. Hyg. 2:123-133, Aug. 1950.

Journal A.O.A.
October, 1954

Structural Diagnosis and Osteopathic Management of Chronic Degenerative Disease

J. BARTLEY JONES, B.S.*
Friendsville, Tenn.

INTRODUCTION

Throughout the history of the healing arts, the physician has been confronted with the problem of chronic degenerative processes in his patients. Methods of treatment have varied from the incantations and amulets of early medicine[1] through the broad spectrum of present-day therapy, but the tissues of the human organism—either locally or generally—continue to regress, grow old, and die.

According to Hippocrates, the old have fewer complaints than the young, "but those chronic diseases which do befall them generally never leave them." This statement is aptly supplemented by one made by Sophocles who stated that "a slight turn of the scales settles old people." Thus history records the recognition by early authorities of senescence and the chronic degenerative diseases attendant thereto. Later writers in the field include Roger Bacon, English scientist of the thirteenth century, and Floyer whose "Medicina Gerocomica" appeared in 1724. In his treatise, Floyer, the first physician to attempt accurate counting of the pulse by the watch, advised " 'moderation in everything together with hot and cold bathing,' covered drug therapy rather extensively, and even used mineral oil to 'lubricate' the intestines."[2] Day's "Diseases of Advanced Life" was published in London in 1849, and treatises by German and French workers appeared later. Included in the latter group was Charcot's "Diseases of Old Age," published in 1881.[2]

More recently, it has been estimated that one out of every six persons is suffering from a chronic degenerative disease. As a result, medical authorities of today are aware more than ever before of this special problem facing a population with an increasing life span. Since 1900, total population has doubled, while the number of persons over 65 years of age has quadrupled.[3] Commenting on the situation, Levitt concludes: "Thus, while man now has longevity as compared to former years, he does not have longevity with sustained vigorous health and social usefulness. This, then, makes chronic or long-term illness which disturbs longevity a most urgent as well as a most complex problem—one which challenges medical science and practice in the United States today."[4]

THE INDIVIDUAL CELL AND DEGENERATVE PROCESSES

Treating the whole organism as the sum total of its components, the osteopathic concept can most readily be understood in its relation to chronic degenerative processes through knowledge of the physiology and pathology of the organism's basic functional unit, the cell. It has been stated that, given an adequate blood supply capable of carrying to the tissues all elements necessary for nutrition, and capable of removing waste products effectively, the cell can live forever. However, this is true only if all other conditions governing the cell's function remain uniform ad infinitum.

Pottenger[5] has described the cell as a physical and chemical reacting entity. Electrolytes are held in labile form within the cell by colloidal systems consisting of protein in water and lipoids. The neutral or isoelectric point of cellular proteins is estimated to be at a hydrogen ion concentration of 4.7. Since proteins form salts with alkalis above this point, and, further, since the hydrogen ion concentration of the tissues is always within an alkaline range, it is apparent that cellular metabolism, either anabolic or catabolic, is a continuous process. Thus, cellular protoplasm varies considerably, depending on the activity of the cell.

The cell membrane is more important from a functional than from an anatomic standpoint. Its permeability, which varies under different conditions, governs the quantity and quality of products passing into or out of the cell. The importance of structural integrity to cellular function is readily evinced by the effect of trauma to or stimulation of an area, the cells of which immediately assume a negative charge initiating a local alteration of metabolism.

The two main headings under which the various methods of controlling cells may be grouped are chemical and nerve. The power of action lies within the cell itself, and thus it can operate independently of nervous impulses. This is borne out in the lowest forms of life which, though bereft of a nervous system, live and change through the medium of chemical action alone. Furthermore, the human embryo during early development has no nervous system, yet growth and differentiation proceed without its aid.

But the fact that cells can act without nervous connection should not minimize the importance of the influence the trophic nervous system has on cellular function. Severance of the nerves to an area only "robs the nerves of a prerogative which has long been assigned to them,"[6] and the cells of the area, formerly capable of responding, can then do nothing more than react.

With both nervous and chemical mechanisms of control intact, each cell has the ability to adapt to stimuli of varying intensity, and the organism can meet the new conditions of its environment, provided these conditions do not exceed certain limits. Should the stimuli exceed the adaptability of the organism, however, the result is a lesion. Under these conditions, no longer are the reactions normal, but they become morbid or pathologic in nature. The individual cell meets abnormal stimuli first by alteration of structure—change in the permeability of the cell membrane and variations in cellular components — followed by distortion of function and leading ultimately to cellular death. To the organism as a whole, these pathologic reactions are the sure signs of degenerative processes. "Disease is nothing else but the sum total of abnormal reactions of the organism or of its parts to abnormal stimuli."[7] It is thus that the individual suffering from a chronic degenerative disease dies cell by cell long before the whole organism expires.

*Dr. Jones, who graduated in June, 1954, was awarded first prize in the Seventh Annual Academy of Applied Osteopathy Prize Contest, open to junior and senior students at osteopathic colleges, while a member of the senior class at the Kirksville College of Osteopathy and Surgery.

STRUCTURAL DIAGNOSIS

The most important phase of structural diagnosis is the detection of the osteopathic lesion, recognized in osteopathic literature consistently during the three quarters of a century since Still first pointed out the significance of changes in the spinal structure. It has been defined as: "Any structural perversion which, by pressure, produces or maintains functional disorder" (Hewlett, 1903).[8] In 1910, however, McConnell, finding the theory of actual osseous pressure on nerves and blood vessels to be untenable, described abnormal reflexes arising in the lesioned articulation which interfere with normal afferent impulses to the spinal cord centers. A few years ago Korr[9] stated, *"An osteopathic lesion represents a facilitated segment of the spinal cord maintained in that state by impulses of endogenous origin entering the corresponding dorsal root. All structures receiving efferent nerve fibers from that segment are, therefore, potentially exposed to excessive excitation or inhibition."* Current osteopathic research has established as scientific fact the hypothesis maintained and practiced by osteopathic physicians of several generations: that reflex activity and structural integrity are inseparably dependent upon each other.

In the preceding section, it was pointed out that the individual cell is under the constant influence of the nervous system, which implies that osteopathic management has much to offer in the way of early detection and arrest of chronic degenerative disease processes. Of tremendous significance here is the fact that an osteopathic lesion in a patient presenting himself for treatment could be either the precursor of a chronic degenerative process or the somatic component of an already established disease, as yet subclinical in its manifestations.

The first symptons of lesion pathology appear as areas of hyperesthesia, with alternations in temperature and sweat gland activity accompanied by slight hyperalgesia. Following close on the heels of these signs, hyperalgesia is increased and edematous soft tissue changes make their appearance. If not corrected during the incipient stage, the frank lesion soon develops, which is characterized by all of the above signs, with the exception that previously soft, boggy tissue is at this time spastic and extremely tender to palpation. Patterns of chronic degenerative disease thus have their beginnings. By this stage, a vicious cycle has been established, resulting in the siege of the area by an unrelenting bombardment of extraneous nerve impulses. The over-all effect on the tissues is cellular fatigue, leading to alterations in metabolism with attendant change in function. These malfunctioning cells are ultimately replaced by the more hardy, less highly specialized fibrous tissue.

Unfortunately, most chronic degenerative disease processes, once entrenched in the organism, are irreversible. The possibilities of complete "cures" for these conditions are remote, and current methods of therapy, therefore, are as yet more palliative than restorative. The greatest single measure in the control of chronic degenerative disease, then, is the early recognition of subclinical symptoms with the subsequent correction of minor conditions that have not yet progressed to the irreversible state. It is in this field that the osteopathic physician should excel, for he is equipped with a diagnostic aid utilized by no other school of medicine.

OSTEOPATHIC MANAGEMENT AND TREATMENT

The distinguishing feature of osteopathic practice has always been the manipulative restoration of structural integrity. In the early years of the profession's development, these technics were a radical deviation from the excessive drugging common at the time. Osteopathic manipulation proved so successful in relieving acute and chronic conditions in which drugs had failed, however, that many early graduates of the first osteopathic colleges felt that a complete system of therapy lay literally at their fingertips. Despite the fact that this was a misconception of Still's original tenet, these pioneers secured for themselves reputations which were instrumental in the framing of the first state laws favoring osteopathy.

Osteopathy, as it is known today, is the most nearly complete school of medicine. It employs all means of therapy available for the good of the patient, among them being osteopathic manipulation. Therapy, from the osteopathic standpoint, may be divided into five major divisions:[10]

1. Osteopathic structural therapy
2. Surgical structural therapy
3. Physical structural therapy
4. Substitution therapy (that is, diet, hormones, vitamins, et cetera)
5. Adjunctive therapy (antiseptics, antibiotics, symptomatic drugs, et cetera).

In the treatment of chronic degenerative diseases, then, the osteopathic physician has at his disposal any or all of the above therapeutic fields, according to clinical requirements of the case at hand.

As previously stated, the prevention and management of the chronic degenerative diseases are based on (1) the recognition of a major basic causative factor, (2) the detectability of this factor at an early stage, and (3) the amenability of this factor to correction before it does irreparable damage.[4] Osteopathic manipulation is important in the last not only by the correction of specific lesions but in maintenance of structural integrity as well. It is significant that the great majority of chronic degenerative processes are familial in nature; examples are the arthritides, arteriosclerosis, diabetes mellitus, and certain types of cancer. For individuals belonging to families in which these tendencies exist, but who show no signs of having the disease themselves, regular manipulative therapy is most important as a prophylactic measure. The disease process may thus be allayed for many years or prevented entirely by careful attention and treatment.

To the individual osteopathic physician, perhaps the most disturbing element in the preventive treatment of chronic degenerative disease is the apparently undramatic response elicited by manipulation. But when it is considered that no drug has proved to be entirely efficacious in chronic degenerative diseases, dramatic response becomes relatively unimportant. This is especially apparent when the insidious nature of the diseases themselves is stressed. With the prevalence of chronic diseases on the increase, each patient who enters the ostopathic practitioner's office today should possibly be viewed as a potential bedridden invalid,

dying by degrees of a chronic degenerative process which he, the practitioner, could prevent. Thus, the maximum effectiveness of osteopathic therapy could be realized.

REFERENCES

1. Sigerist, H. E.: Medicine and human welfare. Yale University Press, New Haven, Conn., 1941.
2. Thewlis, M. W.: Care of the aged. Ed. 3. C. V. Mosby Co., St. Louis, 1941.
3. Christensen, N. J.: Role of osteopathic lesion in chronic degenerative diseases. J. Am. Osteop. A. 53:122-125, Oct. 1953.
4. Levitt, A.: Man's health in this changing world. J. Am. Osteop. A. 53:101-107, Oct. 1953.
5. Pottenger, F. M.: Symptoms of visceral disease. Ed. 6. C. V. Mosby Co., St. Louis, 1944.
6. Pottenger, F. M.: *Op. cit.*, ref. 5, p. 116.
7. Sigerist, H. E.: *Op. cit.*, ref. 1, p. 23.
8. Page, L. E.: Principles of osteopathy. Academy of Applied Osteopathy, Kansas City, Mo., 1952, p. 164.
9. Korr, I. M.: Neural basis of osteopathic lesion. J. Am. Osteop. A. 47:191-200, Dec. 1947.
10. Page, L. E.: Principles of osteopathy. Academy of Applied Osteopathy, Kansas City, Mo., 1952.

NITROUS OXIDE-OXYGEN POTENTIATION A CLINICAL STUDY—GOLDEN

(Continued from page 108)

Certainly an interesting pharmacologic agent such as Thorazine merits further trial in clinical anesthesia in the interest of achieving the ideal of a balanced anesthesia technic.

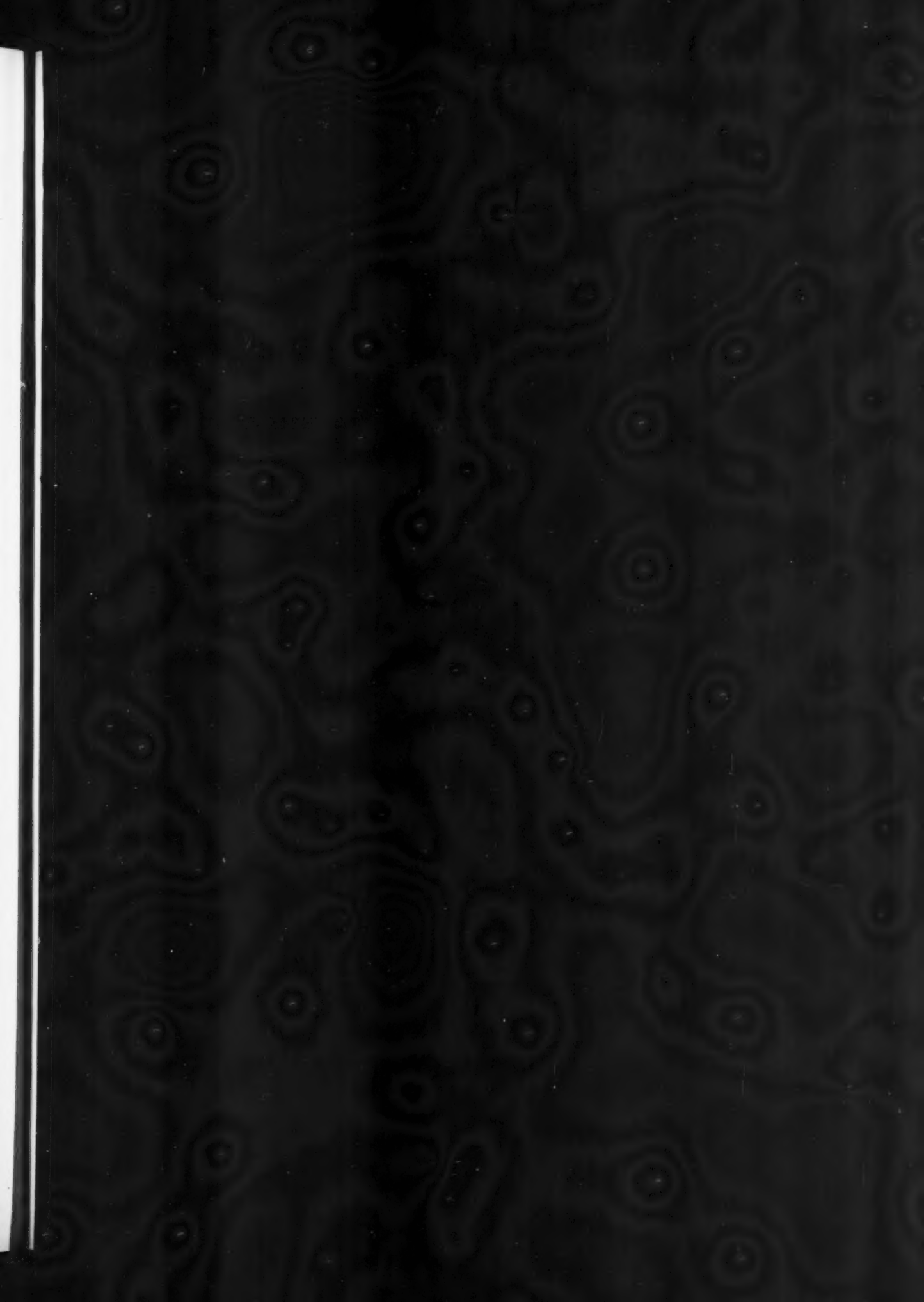
ADDENDUM

Since this paper was submitted for publication, Thorazine has been utilized in 60 additional cases. They fell into the following classifications: Head and neck, 8; upper abdominal, 21 (cholecystectomy, 16; gastrectomy, 5); lower abdominal, 28 (total hysterectomy, 13; appendectomy, 6; pelvic procedures, 8; intestinal resection, 1); extraperitoneal hernioplasty, 3.

ACKNOWLEDGMENT

Acknowledgment and appreciation are extended to members of the surgical and medical staffs of Riverside Hospital for permission to utilize this technic on their patients, and for the cooperation of the surgeons while this technic was being perfected.

1009 Madison St.

REFERENCES

1. Lundy, J. S.: Clinical anesthesia. W. B. Saunders Co., Philadelphia, 1942.
2. Clement, F. W.: Nitrous oxide-oxygen anesthesia. Anesthesiology 7:616-630, Nov. 1946.
3. Seevers, M. H., and Waters, R. M.: Cited by Clement, F. W.: Nitrous oxide-oxygen anesthesia. Ed. 3. Lea & Febiger, Philadelphia, 1951.
4. McKesson, E. I.: Nitrous oxide-oxygen anesthesia in dentistry. Ed. 5. McKesson Appliance Co., Toledo, O., 1947.
5. Adriani, J.: Pharmacology of anesthetic drugs. Ed. 3. Charles C Thomas, Springfield, Ill., 1952.
6. Clement, F. W.: Nitrous oxide-oxygen anesthesia. Ed. 3. Lea & Febiger, Philadelphia, 1951.
7. Guedel, A. E.: Inhalation anesthesia. Ed. 2. Macmillan Co., New York, 1951.
8. Neff, W., Mayer, E. C., and de la Luz Perales, M.: Nitrous oxide and oxygen anesthesia with curare relaxation. California Med. 66:67-69, Feb. 1947.
9. Knight, R. T.: Combined use of sodium Pentothal, Intocostrin (curare), nitrous oxide. Canad. M. A. J. 55:356-360, Oct. 1946.
10. Brotman, M., and Cullen, S. C.: Supplementation with Demerol during nitrous oxide anesthesia. Anesthesiology 10:696-705, Nov. 1949.
11. Foldes, F. F., and Machaj, T. S.: Syncurine (decamethoniumbromide): its use with Pentothal-sodium and nitrous oxide-oxygen anesthesia in abdominal surgery. Anesthesiology 12:366-375, May 1951.
12. Arrowood, J. G.: Mytolon chloride: new agent for producing muscular relaxation; preliminary report. Anesthesiology 12:753-761, Nov. 1951.
13. Artusio, J. F., Jr., Marbury, B. E., and Crews, M.: Quantitative study of d-tubocurarine, tri-(diethylaminoethoxyl) 1,2,3 benzene (Flaxedil) and series of tri-methyl and dimethylethylammonium compounds. Ann. New York Acad. Sc. 54:512-529, Oct. 30, 1951.
14. Golden, A. A.: Flaxedil: new curarizing agent. J. Am. Osteop. A. 50:616-617, Aug. 1951.
15. Brennan, H. J.: Nitrous oxide-oxygen analgesia in major surgery. Anaesthesia 7:27-33, Jan. 1952.
16. Golden, A. A.: Succinylcholine chloride—new muscle relaxant. J. Am. Osteop. A. 52:426-428, April 1953.
17. Lundy, J.: Intravenous anesthesia. Am. J. Surg. 34:559-570, Dec. 1936.
18. Golden, A. A.: Pentothal sodium in safe concentrations. Osteop. Profession 19:8, 10, Nov. 1951.
19. Batterman, R. C.: Clinical effectiveness and safety of new synthetic analgesic drug, Demerol. Arch. Int. Med. 71:345-356, March, 1943.
20. Cimoch, P. J., and Wirts, C. W.: Meperidine hydrochloride used intravenously before gastroscopy; preliminary report. J. Am. M. A. 153:1004-1006, Nov. 14, 1953.
21. Barbour, H. G.: Cited by Shane, S. M., and Ashman, H.: Clinical study of balanced anesthesia mixture; report of 10,000 cases. South. M. J. 45:591-595, July 1952.
22. Watrous, W. G., Davis, F. E., and Anderson, B. M.: Manually assisted and controlled respiration: its use during inhalation anesthesia for maintenance of near-normal physiologic state—a review. Anesthesiology 11:538, Sept.; 661, Nov. 1950; 12:33, Jan. 1951.
23. Buschkens, J. P.: Meperidine (Pethidine) for prophylaxis of cough during intratracheal anesthesia. Nederl. tijdschr. geneesk. 97:331, Feb. 7, 1953.
24. Salter, W. T.: Textbook of pharmacology. W. B. Saunders Co., Philadelphia, 1952.
25. Dundee, J. W.: Influence of controlled respiration on dosage of thiopentone and d-tubocurarine chloride required for abdominal surgery. Brit. M. J. 2:893-896, Oct. 25, 1952.
26. Gray, T. C., and Rees, G. J.: Role of apnoea in anaesthesia for major surgery. Brit. M. J. 2:891-892, Oct. 25, 1952.
27. Werko, L.: Influence of positive pressure breathing on circulation in man. Acta, med. Scandinav. supp. 193, pp. 1-125, 1947.
28. Beecher, H. K., Bennett, H. S., and Bassett, D. L.: Circulatory effects of increased pressure in airway. Anesthesiology 4:612-618, Nov. 1943.
29. Knoefel, P. K., *et al.*: Some effects of positive pressure respiration during anesthesia. Anesthesiology 6:349-354, July 1945.
30. Cournand, A., Motley, H. L., and Werko, L.: Mechanism underlying cardiac output change during intermittent positive pressure breathing. Fed. Proc. 6:92, 1947.
31. Jacoby, J., and Hamelberg, W.: Control of depth during combined anesthesia. Paper read at nineteenth annual meeting of the American Association of Nurse Anesthetists, 1952.
32. Laycock, J. D.: Signs and stages of anaesthesia; restatement. Anaesthesia 8:15-20, Jan. 1953.
33. Artusio, J. F.: Personal communication.
34. Stephen, C. R.: Relation of light or deep anesthesia to shock. Anesthesiology 13:540-544, Sept. 1952.
35. Zweifach, B. W., and Hershey, S. G.: Predisposing action of anesthetic agents on vascular responses in hemorrhagic shock. Surg., Gynec. & Obst. 89:469-477, Oct. 1949.
36. Hershey, S. G., Zweifach, B. W., and Rovenstine, E. A.: Effects of depth of anesthesia on behavior of peripheral vascular bed. Anesthesiology 14:245-254, May 1953.
37. Young, W. G., Jr., Sealy, W. C., and Harris, J. S.: Effects of hypercapnia and hypoxia on response of heart to vagal stimulation. Surg., Gynec. & Obst. 95:51-55, July 1951.
38. Sloan, H. E.: Vagus nerve in cardiac arrest; effect of hypercapnia, hypoxia and asphyxia on reflex inhibition of heart. Surg., Gynec. & Obst. 91:257-264, Sept. 1950.
39. Dripps, R. D.: Immediate decrease in blood pressure seen at conclusion of cyclopropane anesthesia; "cyclopropane shock." Anesthesiology 8:15-35, Jan. 1947.
40. Orth, O. S.: Cited by Miller, F. A., *et al.*: Evaluation of carbon dioxide accumulation in anesthetized patient utilizing portable mass spectrometer to analyze exhaled gaseous concentrations, in Surgical Forum: Clinical Congress of American College of Surgeons, 1950. W. B. Saunders Co., Philadelphia, 1951, pp. 602-610.
41. Terry, R. N.: Controlled respiration as adjunct to general anesthesia. Exhibit at Seventh Postgraduate Assembly of New York State Society of Anesthesiologists, 1953.
42. Foldes, F. F., Ceravolo, A. J., and Carpenter, S. L.: Administration of nitrous oxide-oxygen anesthesia in closed systems. Ann. Surg. 136:978-981, Dec. 1952.
43. Cole, F.: Water accumulation as hazard of rebreathing in anesthesia. J. Am. M. A. 151:910-913, March 14, 1953.
44. James, E.: Personal communication.
45. Golden, A. A.: Anesthesia in geriatric surgery; personal observations. J. Am. Osteop. A. 53:137-143, Oct. 1953.
46. Murray, G.: Cardiac standstill. Surg. Gynec. & Obst. 96:500-501, April, 1953.
47. Waters, R. M.: Nitrous oxide centennial. Anesthesiology 5:551-565, Nov. 1944.
48. Laborit, H.: L'Anesthésie facilitée par les synergies médicamenteuses. Masson & Cie., Paris, 1951.
49. Laborit, H., Huguenard, P., and Alluaume, R.: Un nouveau stabilisateur végétatif (LE 4560 RP). Presse Méd. 60:206-208, Feb. 13, 1952.
50. Jentzer, A.: Hibernation, anesthésie potentialisée, choc postopératoire a l'exclusion de l'hypotension contrôlée. Schweiz. med. Wchnschr. 82:1215-1219, Nov. 22, 1952.
51. Smith, Kline and French Laboratories: Personal communication.
52. Goldblat, A.: Anesthésie par inhibition contrôlée du système neuro végétatif. Acta anaesth. belg. 2:58-75, Dec. 1951.